MCA-104: Computer System Architecture
Master of Computer Applications
Minor Exam

Time: 1 Hour   **Max. Marks: 20**

1. Starting from an initial value for R 11011101, determine the sequence of binary value in R after a logical shift-left, followed by a circular shift-right, followed by a logical shift-right and a arithmetic shift-right.   (2)

2. Using a decoder and external gates, design the combinational circuit defined by the following three Boolean functions: (3)

    $F1 = x'y'z + xz'$

    $F2 = x'yz' + xy'$

    $F3 = xyz' + xy$ (4)

3. Implement the following Boolean functions with a multiplexer:

    $F(w, x, y, z) = \sum(2, 3, 5, 6, 11, 14, 15)$

4. Design a 2-bit count-down counter. This is a sequential circuit with two flip flops and one input x. When x=0, the state of the flip-flops does not change. When x=1, the state sequence is 11, 10, 01, 00, 11, and repeat.   (5)

5. Answer the following questions: (2*3=6)

    a. Add 00011001 and 00010100 using BCD addition.

    b. Represent decimal number 89.46 into floating point binary representation.

    c. Perform arithmetic operation (-42) – (-13) in binary using signed-2's complement representation for negative numbers.