Subject: MCAC -104: Computer Systems Architecture

Time: One Hour **Max. Marks: 30**

Note: All questions are compulsory. Question no. 1 and Q2 carries 8 marks each, Q3 carries 6 marks and Q4 and Q5 carries 4 marks each.

Q 1. Design a bus system for four registers of 8-bit each using three state-buffers.

Q 2. Design a 6-bit binary adder that uses two six-bit registers. Register *A* holds the binary number 001010 and register *B* holds 101101. Initially the carry-in C_0 is set to 0. Find out the values of the outputs: S_1, S_2, S_3, S_4, S_5, and S_6 with the carry-out bits.

Q 3. Find out the micro-operation for the given 14-bit control words: The order (left to right) of the bits in the control words is SEL**B**, SEL**A**, SEL**D** and OPR.

a) 00101000000101

b) 01111111101100

c) 11010000000010

Q 4. For a given bus organized CPU for 15 registers, find out the size of decoder and multiplexers. And show the control word having 6-bit OPR.

Q 5. Simplify the given expression using Boolean algebra:

F = XY'Z + X'Y'Z + W'XY + WX'Y + WXY