NATIONAL INSTITUTE OF TECHNOLOGY KURUKSHETRA

Course B. Tech (IT), ITPC203: Computer Organization and Architecture

MID SEM-I

Question 1. The following transfer statements specify a memory. Explain the memory operation in each case (5 marks)

(i) R2 ←M[AR]

(ii) M[AR] ←R3

(iii) R5 ←M[R5]

Or

Question 1 Starting from an initial value of R=11011101, determine the sequence of binary values in R after a logical shift-left, *followed by a circular shift-right, followed by a logical shift-right and circular shift-left.*(5 marks)

Question 2. Estimate the speedup that would be obtained by replacing a CPU having an average CPI (clock cycles per instruction) of 5 with another CPU having an average CPI of 3.5, with the clock period increased from 100 ns to 120 ns. (5 marks)

Question 3. A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers. (5 marks)

a. How many selection inputs are there in each multiplexer?

b. What size of multiplexers are needed?

c. How many multiplexers are there in the bus?

Question 4 Design an arithmetic circuit with one selection variable S and two n-bit data inputs A and B. The circuit generates the following four arithmetic operations in conjunction with the carry C_{in}. Draw the logic diagram for the first two stages. (5 marks)

S	C_{in}=0	C_{in}=1
0	D=A+B (add)	D=A+1 (increment)
1	D=A-1 (Decrement)	D=A+B' +1(subtract)