Roll Number:_____ Name:_____

MST Exam 2017

Computer Science & Engineering Department, Thapar University Patiala

Course Code: UCS-507 **Name of Faculty: Dr. Anju Bala, Dr. Rupali Bhardwaj**

Course: Computer Architecture & organization **Dr. Anjali, Ms. Arzoo**

Time: 2 Hours; MM: 25 **Date: 19.09.2017**

Note: All questions are compulsory. Attempt each question in order.

Q1a. Design a 2-bit arithmetic circuit with one selection variable S and two n-bit data inputs A & B. The circuit generates the following four arithmetic operations in conjunction with the input carry C_{in}. Draw the logic diagram for the first four stages.

S	***C_{in}=0***	***C_{in}=1***
0	**D=A+B**	**D=A-B**
1	**D=A+1**	**D=A-1**

(4)

Q1b. Describe Instruction cycle in brief with flowchart. Specify corresponding micro operations at each stage. (2+2)

Q2a. The following control inputs are active in the bus system. For each case, specify the register transfer that will be executed during the next clock transition. (4)

	S_2	**S_1**	**S_0**	**LD**	**Memory**	**Adder**
a.	**0**	**1**	**0**	**AR**	**-**	**-**
b.	**1**	**1**	**1**	**DR**	**RD**	**-**
c.	**1**	**1**	**0**	**-**	**WR**	**-**
d.	**0**	**0**	**0**	**AC**	**-**	**Add**

Q2b. Design a combinational circuit with three inputs x, y, z and three outputs A, B, C. When the binary input is 0, 1, 2 or 3, the binary output is three greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is two less than the output. (3)

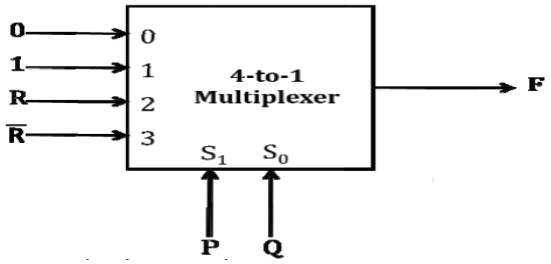
Q3a. A processor has 40 distinct instructions and 24 general purpose registers. A 32-bit instruction word has an opcode field, register operand field and an address field.

i) How many total words available in memory and what is the size of each memory word?

ii) Draw the instruction word format and indicate number of bits in each part.

(3)

Q3b. Write the minimal SOP form of Boolean expression for the output of the following multiplexer is?



. (2)

Q4. The content of AC in the basic Computer is hexadecimal B89F and the initial value of E is 0. Determine the contents of AC, E, PC, AR and IR in hexadecimal after the execution of instruction at content of IR is 7800. Execute all other 11 instructions in tabular form starting from the initial values and the starting value of PC is 021. (5)