Nepal College of Information Technology

Assessment

Level: Bachelor **Year : 2021**

Program: BE-SE **Full Marks: 100**

Pass Marks: 50

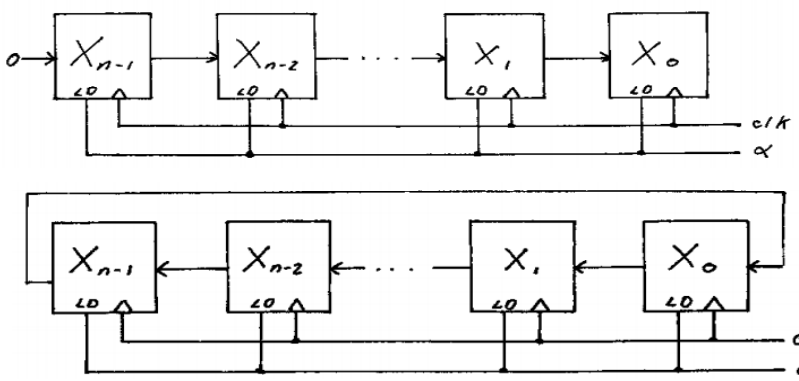
Subject: Computer Organization and Architecture **Time : 3 hrs**

Candidates are required to give their answers in their own words as far as practicable.

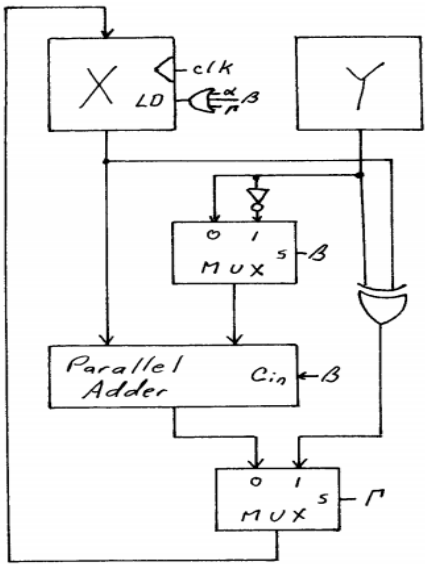
The figures in the margin indicate full marks.

Attempt all the questions.

1. a) what do you mean by ISA? Explain the Assembling and the compiling Process with block diagram. (7)
   b) Identify the microoperations depicted by the following figures and write the RTL code also: (4)

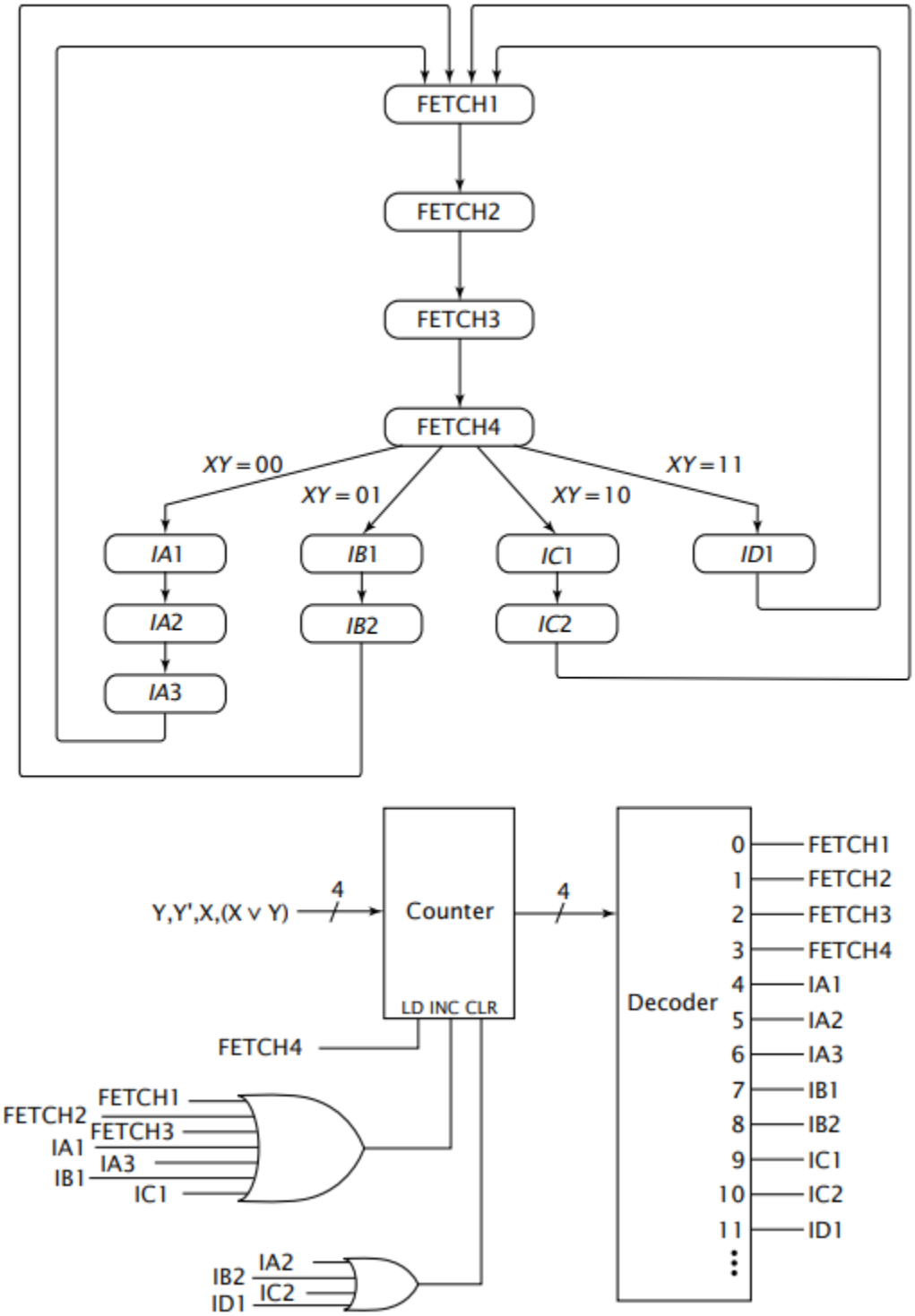


c) List down the RTL code that will result in following hardware combination. (4)



2. a) Design a 16*4 memory subsystem with high-order interleaving using 8*2 memory chips for a computer system with an 8-bit address bus. (7)
   b) A computer system with an 8-bit address bus and 8-bit data bus uses isolated I/O. It has 64 bytes of ROM starting at address 00H; 128 bytes of RAM starting at address 40H; an input device at address 40H. Show the design for this system. (8)

3. a) In the given figure the control unit doesn't realizes the state diagram correctly. Modify the control unit so that it correctly realizes the given state diagram. (5)



b) Design the state diagram, register section and ALU for the very simple CPU with the following set of instructions. (10)

Very Simple CPU has the following instructions.

- JMP AAAAAA (Jump to address AAAAAA)
- ADD AAAAAAAA (Add content of accumulator to the binary value AAAAAAAA)
- LDA AAAAAAAA (Load accumulator with the binary value AAAAAAAA)
- STA AAAAAA (load the given memory address with the content of accumulator)

4. a) Design a micro-sequencer control unit with vertical microcode for the above CPU. (8)

   b) What do you Mean by computer arithmetic? How the overflow occurs in unsigned two's complement addition and subtraction. (7)

5. a) What is virtual memory? Explain about paging and segmentation techniques regarding the memory management. (1+6)
   b) Show step by step multiplication process with Booth's RTL code for multiplication of 14 * (-14). (8)
6. a) How are memory organized in multiprocessor system? Explain with suitable diagrams. (7)
   b) How DMA performs data transfer? Explain different DMA transfer modes and mention there best use case scenarios. (8)
7. a) Which conflict is depicted by following instructions? Explain two solutions for the problem. (5)

   I1: R1 ← R2+R3
   I2: R4 ← R5+R6
   I3: JUMP 6
   I4: R7 ← R8+R9
   I5: R10 ←R11+R12

   I6: R13 ← R14+R15

   b) Describe register windows. (5)