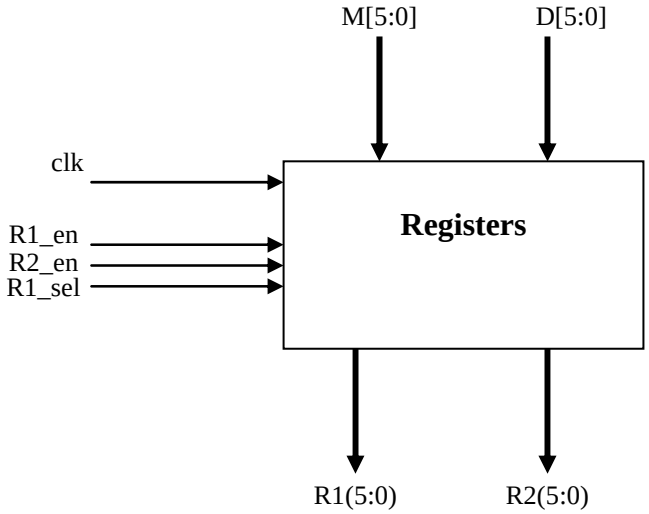
1. Assume a computer system has a simple instruction set described as follows:

Command	2-bit Instruction	6-bit Data	Description
Move1	00	d5d4d3d2d1d0	Move data d5d4d3d2d1d0 to register R1.
Move2	01	d5d4d3d2d1d0	Move data d5d4d3d2d1d0 to register R1.
Shift	10	XXXd2d1d0	Left rotate the content of R1 by d2d1d0 bits and store the result back to R1.
Mask	11	XXXXXX	Mask the content of R1 and R2, store the result back as register R1.

The registers block has two 6-bit input data ports: M[5:0] and D[5:0]; the former is from the memory source and the latter is from the datapath. The output of R1 and R2 are connected to the datapath module. The Control signals R1_en and R2_en are the enable signals for R1 and R2 respectively. Control signal R1_sel is used to select the sources of R1.



The function of the registers block is described in the following table:

R1_en	R2_en	R1_sel	clk	R1[5:0]	R2[5:0]
1	0	0	↑	M[5:0]	No Change
1	0	1	↑	D[5:0]	No Change
0	1	X	↑	No Change	M[5:0]

a) Write the truth table of the instruction decoder. Use the 2-bit instruction as inputs and R1_en, R2_en, R1_sel as outputs.

b) Complete the following program that performs the divide-by-two function. By the end of the program you should have data (0, 0, a5, a4, a3, a2) stored in R1.

move1 a5a4a3a2a1a0 -- move data a5a4a3a2a1a0 into R1