Q1:

Since we have four possible functions, each multiplexor should select one of four possible inputs. Additionally, each multiplexor should be connected to the same 2-bit selector. Also, the same clock is connected to all the D flip flops. The inputs into the multiplexors depends on the output you want. There is one multiplexor per "slot" (since want to select one input for each D flip flop), as well as an additional multiplexor for Bout. Below are the expected outputs based on the functions.

S1	**S0**	**Function**	**Slot 7**	**Slot 6**	**Slot 5**	**Slot 4**	**Slot 3**	**Slot 2**	**Slot 1**	**Slot 0**
0	0	No shift/ hold	A7	A6	A5	A4	A3	A2	A1	A0
0	1	Shift right	Bin	A7	A6	A5	A4	A3	A2	A1
1	0	Shift left	A6	A5	A4	A3	A2	A1	A0	Bin
1	1	Circular shift right	A0	A7	A6	A5	A4	A3	A2	A1

Ex. if 01, the output is Bin A7 A6 A5 A4 A3 A2 A1.

If no shift (S1 = 0, S0 = 0), want same output (A7 A6 A5 A4 A3 A2 A1 A0), so want multiplexor 7 (MUX 7) to choose A7, MUX 6 to choose A6, etc., and want D flip flop to keep values in "slots" (slot 7 is A7, slot 6 is A6, …).

If shift right (S1 = 0, S0 = 1), want to shift all bits right (MUX 6 picks A7, MUX 5 picks A6, …) and feed Bin into slot 7. A0 is shifted out and stored in Bout.

If shift left (S1 = 1, S0 = 0), want to shift all bits left (MUX 7 picks A6, MUX 6 picks A5), feed Bin into slot 0, and take A7 and store in Bout.

If circular shift right (S1 = 1, S0 = 1), shift all bits right (MUX 6 picks A7, MUX 5 picks A6) and take value from slot 0 (A0) and move to slot 7 (slot 7 is A0).

Additionally, there is a multiplexor (MUX OUT) that chooses the value of Bout. For 00 and 11, there is no bit shifted out, so Bout is the input (meaning hold value of Bout). However, if select 01, A0 is shifted out and stored in Bout. If select 10, A7 is shifted out and stored in Bout.