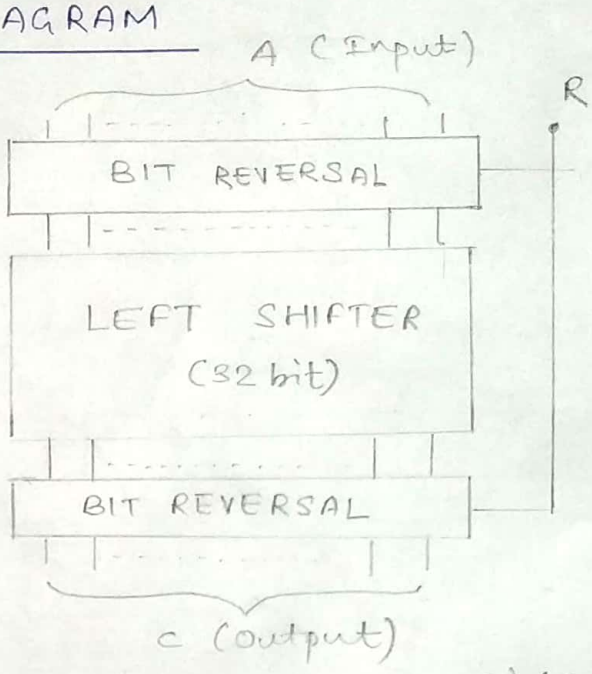
ASSIGNMENT - 1

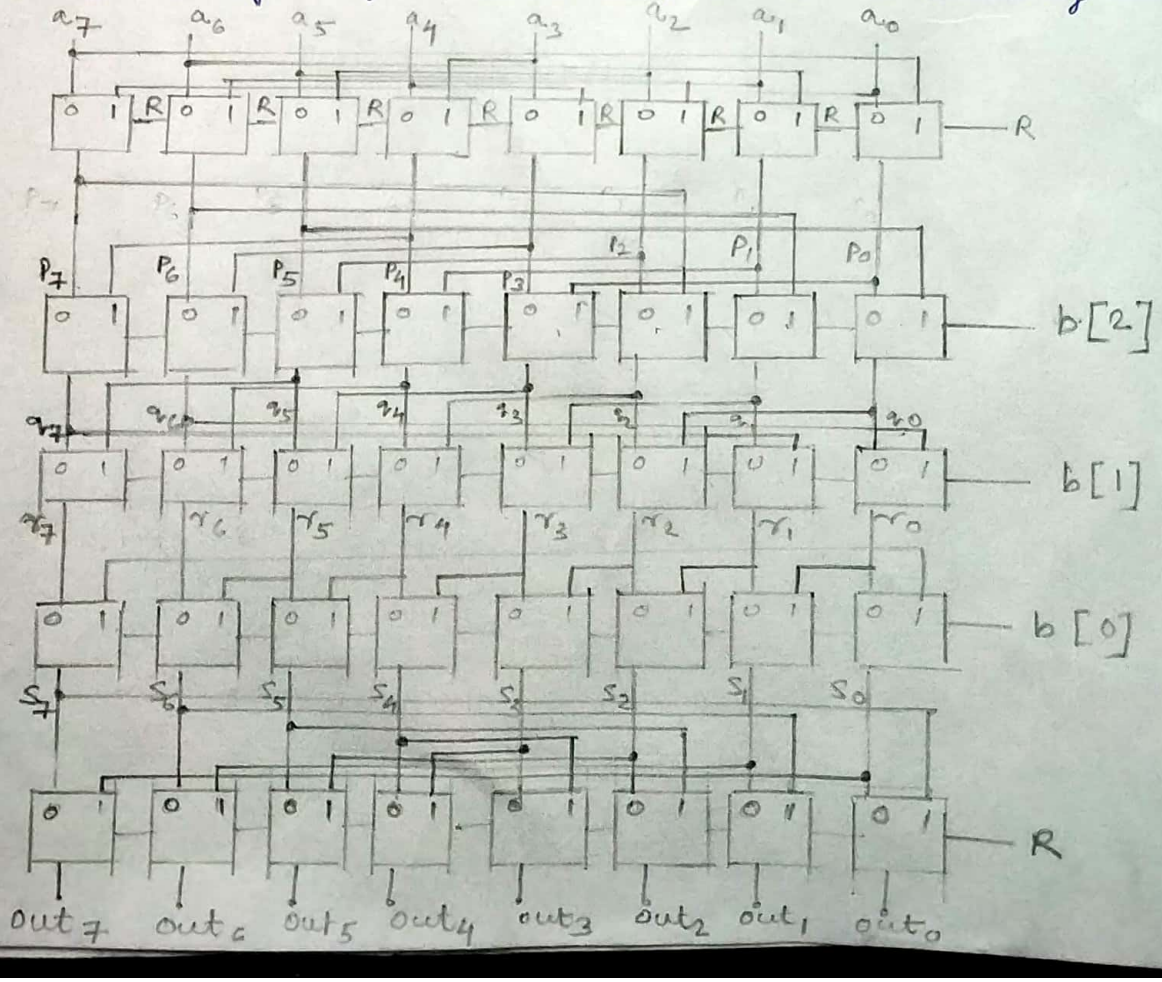
GROUP 3 — Kshitij Agrawal (17EC10063) | Aadi Swadipto Mondal (17EC10065)

CIRCUIT DIAGRAM



Structure of Left Right shifter

* For 8-bit Left Right barrel shifter. Can be similarly extended to 32 bit

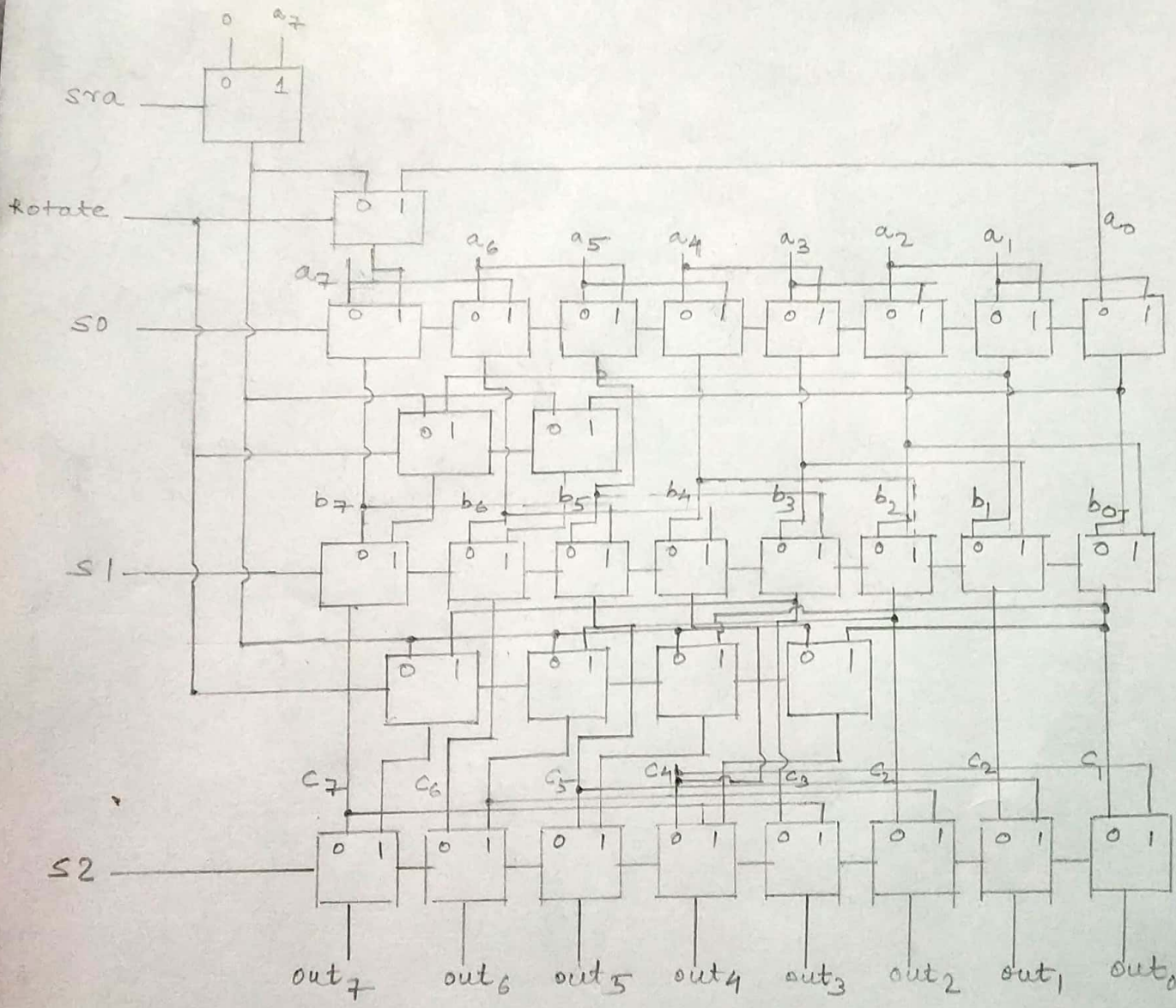


The total num. of 2×1 mux used is

$(5 + 2) \times 32 = \boxed{7 \times 32 \text{ MUX}}$

(5: for shifting; 2: for bit reversal)

Answer these questions



Working

We use 1 mux(2×1) to decide between shift logical & arithmetic. This output is fed to the set of rotate mux-es on the LOW input and the rotate value {a_0 for 1 level rotate, a_1 a_0 for 2, a_3 a_2 a_1 a_0 for 4 level} on the HIGH input. The rotate logic is same as the barrel shifters. Just an extra shift operation is multiplexed at each rotator.

Rotate → shift

Total mux = $n \log_2 n$ (All layers) $+ (n-1) + 1 = n(1 + \log_2 n)$