1. (16 pts) Find the transition table and the state table for the Mealy sequential circuit below.

\[
D_C = Z = X_1 \cdot X_2 \cdot A \cdot C' \\
D_A = X_2 \oplus A \\
D_B = X_1 \oplus B
\]
2. (8 pts) The sequential circuit below yields an output sequence of $Z = 11011111$ when you apply the input sequence $X = 01101010$. What is the starting state $A$?

Since $X = 0$ initially and $Z = 1$, the $A \oplus X = Z = 1$ requires that $A = 1$ initially.

3. (16 pts) Determine the D flip-flop realization of the sequential circuit specified by the following transition table. Write the combinational logic expressions for the flip-flop inputs and draw the logic circuit diagram.
\( A^+ = D_A = BCX + A'B'C'X \)
\( B^+ = D_B = AX' + BCX' + BC'X + B'CX \)
\( C^+ = D_C = C'X' \)
\( Z = AX' + B'C + BC'X \)
4. (10 pts) The circuit below has three D flip-flops, one is level triggered (i.e. triggers based on the level of the clock). The other two are edge triggered, one on the positive-edge and the other on the negative-edge. Complete the timing diagram by filling in the waveforms for A, B, and C.

Propagation delay is assumed to be 1/2 division