Exercise Problems I

Design the hardware interface and write an 8086-assembly program for the following projects. The addresses of ports A, B and C of the 8255A PIA are 00 H, 04 H, 08 H and 0C H respectively. Assume that the forward voltage of a LED (V_D) is 3V, and the required current (I_D) is 8 mA.

1. The assembly program flashes 16 LEDs connected to PORT A and PORT B (5 times), in current sinking mode. Use delay intervals between outputs (ON time is 0.4 seconds, and OFF time is 0.8 second).
2. The assembly program turns 16 LEDs ON alternately in an anticlockwise manner, where only one LED is ON at any time. The LEDs are connected to PORT A and PORT B of the 8255A PPI in current sourcing mode. Use one second delay intervals between outputs.
3. The assembly program flashes eight LEDs connected to PORT B in current sinking mode as follows:
   - Turn the four LEDs connected to PB0 - PB3 ON for 0.5 seconds, then turn them OFF for 1½ seconds.
   - Turn the four LEDs connected to PB4 - PB7 ON for 1½ seconds, then turn them OFF for 0.5 seconds.
   - Repeat (10 times).
4. The assembly program turns 8 LEDs ON alternately, where only one LED is ON at any time. The program rotates one turned-on LED in a clockwise direction (until it reaches the last LED), then it rotates the turned-on LED in an anticlockwise direction, and so on. The LEDs are connected to PORT B of the 8255A.
5. The assembly program turns 16 LEDs ON alternately, where only one LED is ON at any time. The program rotates one turned-on LED in a clockwise direction (until it reaches the last LED), then it rotates the turned-on LED in an anticlockwise direction, and so on. The LEDs are connected to PORT A and PORT B of the 8255A.