1- System Construction:
   - System is consisted of a microcontroller unit connected to two push buttons, an LCD, a calculator Keypad and an LED.
   - The push buttons are active low.
   - The LCD is a 2*16 character LCD.
   - The calculator Keypad is 4*4 keypad consisted of the following buttons:
      - Number keys from 0 to 9.
      - Operators keys (+, -, *, / and =).
      - On/C key.
2- Customer requirements:
   - Power On and system startup:
      - After power on, a welcome message shall appear on the LCD on the first row.
      - The welcome string shall start by a moving string “welcome” from right to left then from left two right for three cycles.
      - The cycle time shall be 1 second (0.5 for the forward direction and 0.5 for the backward direction).
      - At the end of the welcome cycles, a new string shall be blinking on the LCD “Press any Key to Continue”.
      - The blinking time shall be 0.5 second for the display time and 0.25 second for the empty screen time.
      - If no key pressed for 10 seconds, nothing will be displayed on the LCD and the LED shall start its blinking pattern.
      - The LED-blinking pattern shall be described later.
      - If any key is pressed within the 10 seconds or during the LED stand by pattern, the system shall start its calculator operation.
   - LED blinking pattern:
      - LED blinking pattern shall be consisted of 4 stages (rising, high, falling and low stage).
      - The pattern cycle time is 1 second and each stage is 250 ms.
      - The rising stage shall be a pwm signal that is increasing from 0% to 100% on a number of steps.
      - The number of steps shall be 10 (step accuracy is 10% and the step time is 25ms).
      - The high stage shall be a constant high signal (5v).
      - The falling stage shall be a pwm signal that is decreasing from 100% to 0% on a number of steps.
      - The number of steps shall be 10 (step accuracy is 10% and the step time is 25ms).
      - The low stage shall be a constant low signal 0v.
   - Normal Calculator operation:
      - If a number Key is pressed its value shall be displayed on the screen.

- If an operator key is pressed, its value shall not be displayed on the screen but it will be stored as the last operation.
- If an operator key is pressed, the resultant operation shall be displayed instead of the displayed number.
- If the operation is pressed for the first time, the result shall be the same value of the displayed number.
- If a number key pressed after an operation key, the new number shall replace the old number.
- If number of digits pressed exceed 16, the next press shall be ignored.
- If push button is pressed for a time less than 3 seconds, the last number shall be cleared.
- If push button is pressed for a time 3 seconds or more, the screen shall be cleared and the stand by LED pattern shall be started.
- If the On/C is pressed, 0 shall be displayed on the screen.