1998 Paper 2 Question 10

Structured Hardware Design

The user interface to a microwave oven consists of a washable membrane keyboard and an LCD panel. All of the interface electronics is to be integrated onto a single ASIC (application-specific integrated circuit).

(a) Briefly sketch or describe the overall structure of the microwave oven and define the connections to the ASIC.   [5 marks]

(b) The keyboard has 25 keys that are simple push-to-make switches. For minimal pin use, these are to be scan multiplexed. Sketch or describe the way the keypad is connected to the ASIC and the circuitry to scan the keypad. How is debouncing handled?   [12 marks]

(c) If the main functions within the ASIC are implemented with software on an imbedded microprocessor, discuss whether it is worthwhile having dedicated electronics to scan the keyboard and display.   [3 marks]