

1996 Paper 3 Question 7

Structured Hardware Design

A design is required for a novelty LED flasher that is to be small, battery operated and mounted inside a compact disc box as a promotional gimmick. The device has one LED only, and this produces bright pulses at approximately one Hertz. Instead of being entirely regular, the pulses are to be perceptibly irregular, in a way which grabs the attention of the careful observer. There will be a single production run of 18 million units.

Discuss aspects of the design process, including the circuitry, whether to include a microprocessor, what, if any, ASIC technology to use, how many prototypes to generate and how they will be evaluated, and testing of the product. [15 marks]

The design specification is now changed, so that now a meaning is attached to the slight deviations from a regular pulsing pattern. In particular, the pattern must slowly and repeatedly convey a built-in secret message of about 100 characters. It is acceptable that the decoding operation would be hard for the man in the street, but possible by an intelligent alien or computer scientist. How does this influence the design approach and cost? [5 marks]