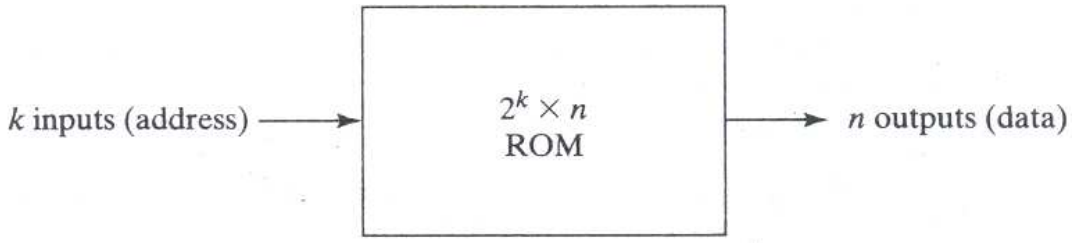
ROM& PROM

A read-only memory (ROM) is essentially a memory device in which permanent binary information is stored. The binary information must be specified by the designer and is then embedded in the unit to form the required interconnection pattern. Once the pattern is established, it stays within the unit even when power is turned off and on again.

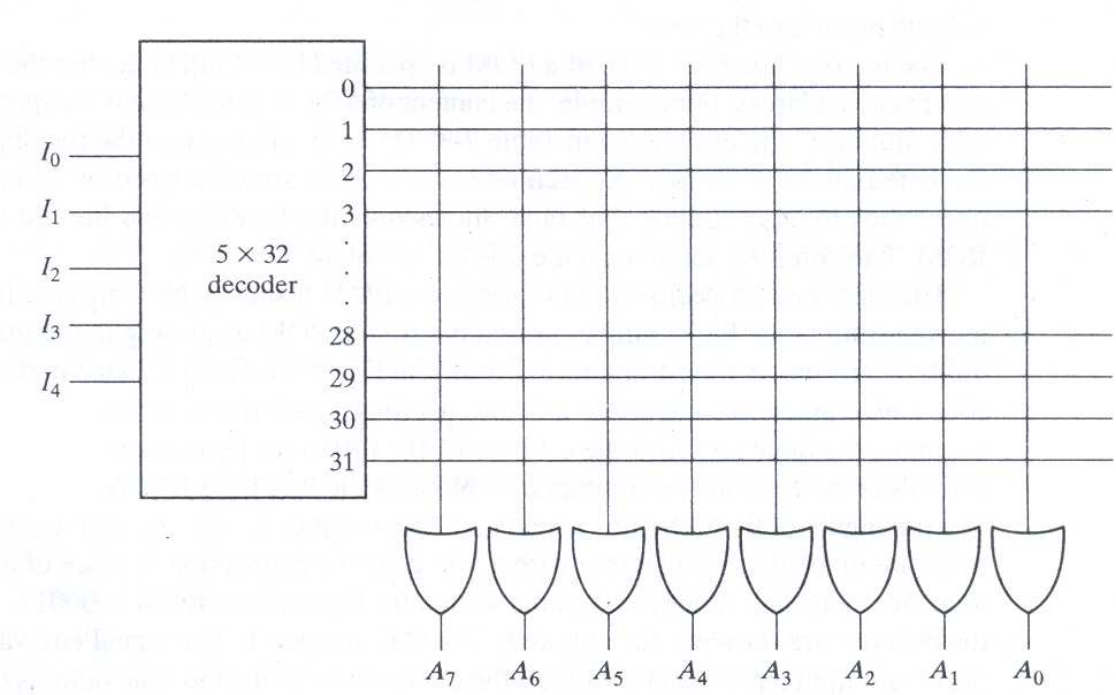
A block diagram of a ROM is shown in Fig 1. IT consists of k inputs and n outputs. The inputs provide the address for the memory and the outputs give the data bits of the stored word which is selected by the address. The number of words in a ROM is determined from the fact that k address input lines are needed to specify 2^k words. Note that ROM does not have data inputs because it does not have a write operation. Integrate



Circuit ROM chips have one or more enable inputs and sometimes come with three-state outputs to facilitate the construction of large arrays of ROM.

Consider for example a 32 × 8 ROM. The unit consists of 32 words of 8 bits each. There are five input lines that form the binary numbers from 0 through 31 for the address. Fig 2 shows the internal logic construction of the ROM. The five inputs are decoded into 32 distinct outputs by means of a 5 × 32 decoder. Each output of the decoder represents a memory address. The 32 outputs of the decoder are connected to each of the eight OR gates. The diagram shows the array logic convention used in complex circuits (see Fig). Each OR gate must be considered as having 32 inputs. Each output of the decoder is connected to one of the inputs of each OR gate. Since each OR gate has 32 input connections and there are 8 OR gates, the ROM contains 32 × 8 = 256 internal connections. In general, a 2^k × n ROM will have an internal k × 2^k decoder and n OR

gates. Each OR gate has 2^k inputs, which are connected to each of the outputs of the decoder.



Internal Logic of a 32 × 8 ROM