11.50. Consider that the convolutional encoder of Fig. 11-6 is used over a binary symmetric channel (BSC). Assume that the initial encoder state is the 0 0 state. At the output of the BSC, the received sequence is $\mathbf{r} = (1\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 1\ 1$ rest all 0). Find the maximum likelihood path through the trellis diagram and determine the first 5 decoded data bits.

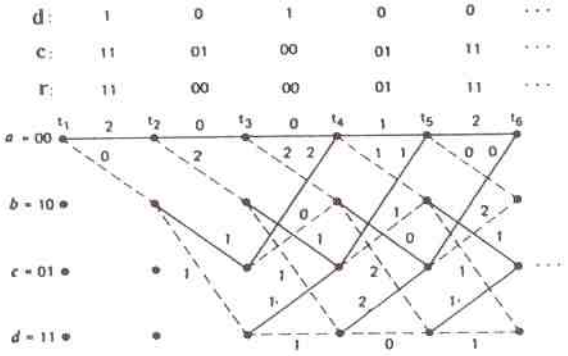

Fig. 11-15 Decoder trellis diagram

Figure 11-15 shows the trellis diagram with branch metric, which is the Hamming distance between the branch output word and received sequence. According to Viterbi decoding, we proceed as follows:

First, cumulative path metric of a given path at time t_i is computed. If any two paths in the trellis merge to a single state, one of two having greater metric will be eliminated. Should metrics of the two entering paths be of equal value, one path is chosen by flipping a coin. This process is repeated at time t_{i+1}. Figure 11-16 shows this process, and the surviving path into each state is shown in Fig. 11-16 (*d*), (*f*), and (*h*). Finally, at time t_6 we decide the most likely path *abcbca* (with metric 1), as shown in Fig. 11-16 (*h*). From Fig. 11-9, the corresponding code word is $\mathbf{c} = (1\ 1\ 0\ 1\ 0\ 0\ 0\ 1\ 1\ 1)$ and the first 5 data bits are 1 0 1 0 0.