NANYANG TECHNOLOGICAL UNIVERSITY
School of Electrical and Electronic Engineering

E6101 DIGITAL COMMUNICATIONS

Tutorial 2

1. Draw the state diagram, tree diagram, and trellis diagram for the convolutional encoder characterized by the block diagram in Figure 1.

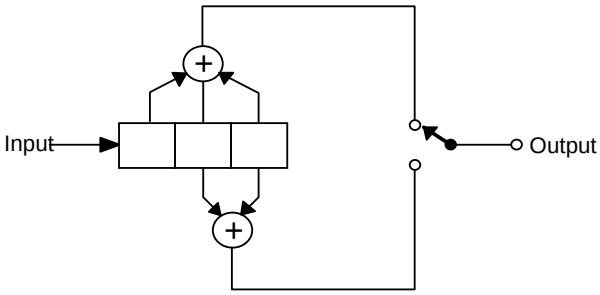

Figure 1

2. Find the free distance of the encoder of Problem 1 by the transfer function method.

3. Consider that the K = 3, rate ½ encoder with state diagram shown in Figure 2 is used over a binary symmetric channel (BSC). Assume that the initial encoder state is the 00 state. At the output of the BSC, the sequence **Z** = (1 1 0 0 0 0 1 0 1 1 rest all "0") is received.

(a) Find the maximum likelihood path through the trellis diagram, and determine the first 5 decoded information bits. If a tie occurs between any two merged paths, choose the upper branch entering the particular state.

(b) Identify any channel bits in **Z** that were inverted by the channel during transmission.

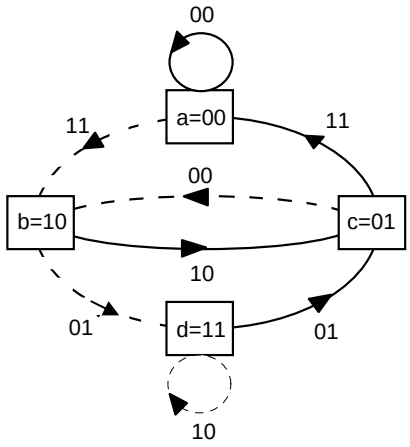

Figure 2