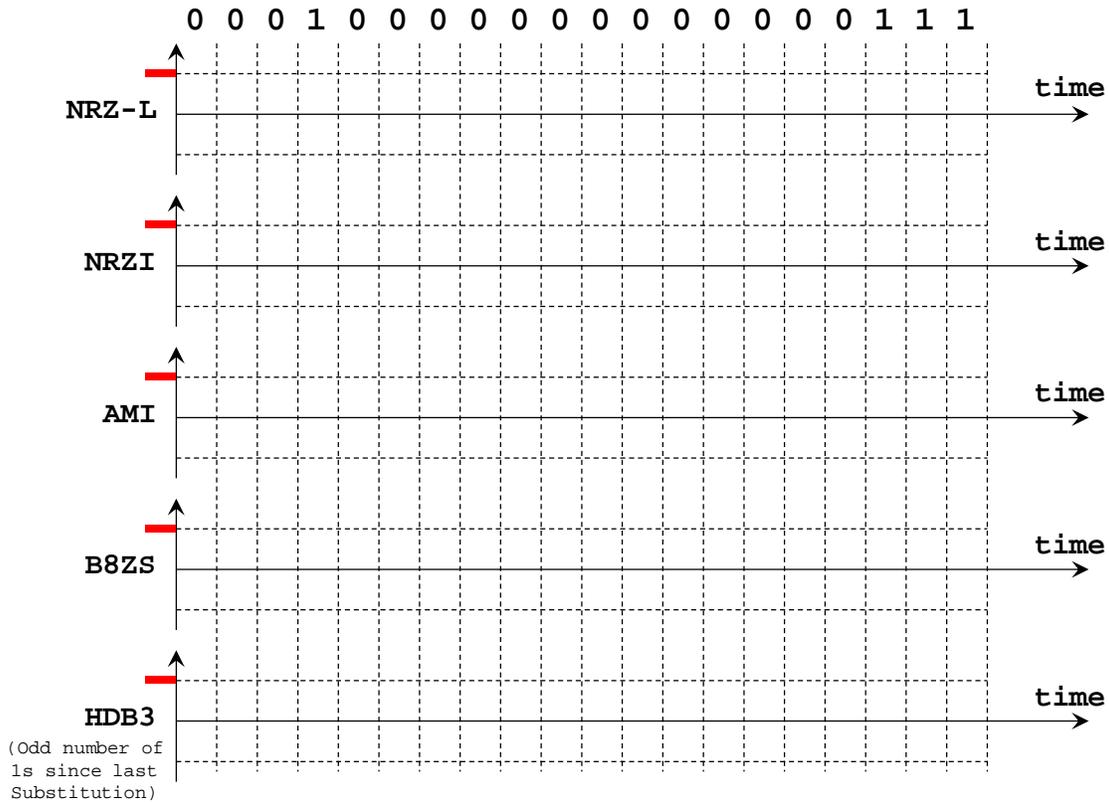# King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering
Department of Computer Engineering

COE 341 – Data & Computer Communications (T111)

Homework # 02 (*due date: Sunday 20/11/2011 during class period*)

*** Show all your work. No credit will be given if work is not shown! ***

Problem # 1 (75 points; 15 points each): Complete the following signal diagrams.

```
        0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1

NRZ-L                                                                  time


NRZI                                                                   time


AMI                                                                    time


B8ZS                                                                   time


HDB3                                                                   time
(Odd number of
1s since last
Substitution)
```

Problem # 2 (25 points): Using the BER curve, calculate the *maximum data rate* that can be achieved by **ASK** for a bit error rate of 10^{-6} on a channel with an SNR of 23.5 dB and a bandwidth of 10 MHz.