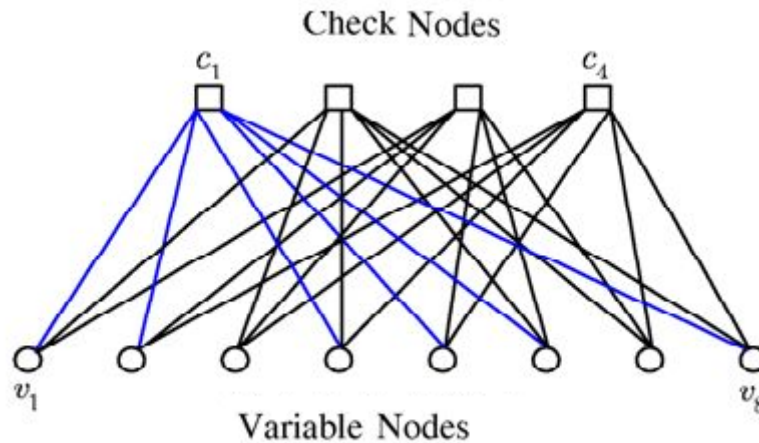


ELEC 6131 – Error Detecting and Correcting Codes Assignment 9

- 1) The error locating polynomial of double error correcting RS code over $GF(2^4)$ is $\sigma(X) = \alpha^5 X^2 + \alpha^2 X + 1$. Find the location of errors.
- 2) Derive the parity check matrix of (15, 11) Hamming code (7 Marks). Decode the received stream. Decode the stream $r(X) = X^{14} + e_{12}X^{12} + e_1X + 1$.
- 3) Consider the convolutional encoder with generating function $G(D) = \left[\frac{1+D^2}{1+D+D^2}, \frac{D}{1+D+D^2} \right]$. Is this encoder catastrophic? Why?
- 4) Consider the Galois field $GF(2^4)$ generated by the polynomial $p(x) = x^4 + x + 1$. Find the generator polynomial of a primitive binary BCH code with $n = 15$ and $t = 2$ (7 Marks). What is the minimum distance and the rate of the resulting code?
- 5) Find the expression for the LLR of $x \oplus y$ in terms of the LLR's of x and y .
- 6) Consider a code with the following Tanner graph:



- a) Write the parity check matrix of the code.
- b) What are the row and column degree distribution functions?
- c) Find the rate of the code.
- d) Is 01011001 a codeword?
- e) Decode $e_1 1 e_3 0 1 e_6 1 0$ where e_1, e_3, e_6 are erasures.