

Code No: 155BG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, February - 2022

ERROR CORRECTING CODES

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

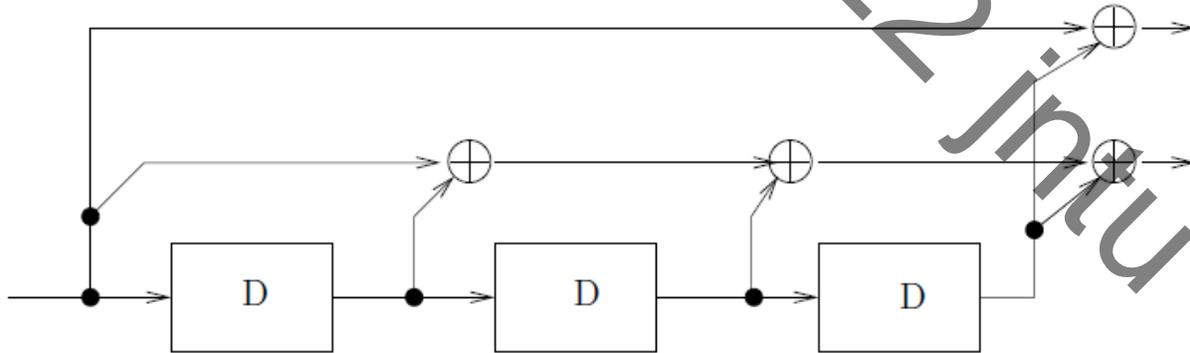
1. Discuss encoding circuit for a linear systematic (n, k) block code. [15]

2. Consider two codes with parity-check matrices
 $H = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix}$ and $H = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 \end{bmatrix}$ respectively.
 a) Determine all code words of the two codes
 b) Provide G and H in symmetric form for both codes. [7+8]

3. Justify that $g(x) = 1 + x^2 + x^4 + x^6 + x^7 + x^{10}$ is a generator polynomial for a $(21, 11)$ cyclic code. Determine the check polynomial of this code. [15]

4. Let $g(x)$ be the generator polynomial of a binary cyclic code of length n . (a) Justify that if $(x + 1)$ is a factor of $g(x)$, the code contains no odd-weight code words. (b) If n is odd and $(x + 1)$ is not a factor of $g(x)$, justify that the code contains the all-1s code word. [15]

5.



Consider the convolutional encoder shown in Fig above, Determine the transfer function matrix for the convolutional code and draw one stage of the trellis for the encoder. [15]

6. Discuss maximum-likelihood decoding. [15]

7. Distinguish serial concatenation and parallel concatenation. [15]

8. Analyze the performance of Multi – Layer Detection Schemes. [15]