

MPTEI

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Courses » Error Control Coding: An Introduction to Convolutional Codes

Announcements Course Ask a Question Progress Mentor

Unit 3 - Week-2

Course outline

How to access the portal

Week-1

Week-2

- Convolutional Codes: Classification, Realization
- Convolutional Codes:Distance Properties
- Decoding of Convolutional Codes-I: Viterbi Algorithm
- Decoding of Convolutional Codes-II: BCJR Algorithm
- Quiz : Assignment-2
- assignment -2 solutions

Week-3

Week-4

Assignment-2

The due date for submitting this assignment has passed. Due on 2016-03-29, 23:55 IST.

Submitted assignment

Assignment for Week-2

- 1) The number of states for rate $R = \frac{1}{2}$ convolution code with $G(D) = \left[1 \quad \frac{1+D+D^2+D^3}{1+D^3}\right]$ is 1 point
 - 3
 - 0 4
 - 8
 - None of the above

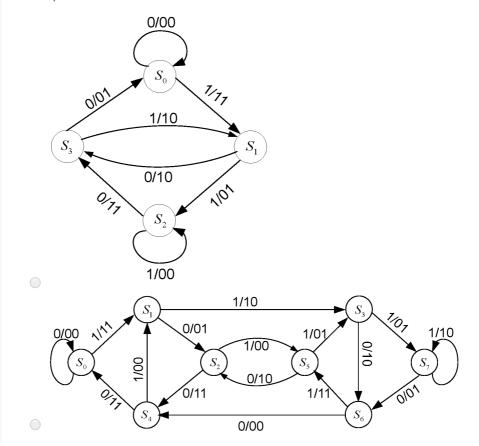
No, the answer is incorrect.

Score: 0

Accepted Answers:

4

2) State diagram of convolutional encoders are shown below. Which of the following represents *1 point* a catastrophic encoder?

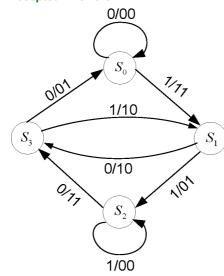


- Both of the above
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:



- 3) Given a rate $R = \frac{1}{n}$ convolutional code, which realization will always result in minimal encoder realization.
 - Controller canonical form realization
 - Observer canonical form realization
 - Both of the above
 - None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Controller canonical form realization

4) Equivalent systematic generator matrix for rate $R=\frac{2}{3}$ convolution code with

1 point

1 point

$$\mathbf{G}(D) = \begin{bmatrix} 1 & 1 & 1+D \\ 0 & D & 1+D^2 \end{bmatrix} \mathbf{i}$$

$$\begin{bmatrix} 1 & 0 & 1+D \\ 0 & 1 & 1+D^2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 0 & D & 1 + D \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & \frac{1+D}{D} \\ 0 & 1 & \frac{1+D^2}{D} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1+D \end{bmatrix}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\begin{bmatrix} 1 & 0 & \frac{1+D}{D} \\ 0 & 1 & \frac{1+D^2}{D} \end{bmatrix}$$

) 1 point

Equivalent systematic generator matrix of a rate $R = \frac{2}{3}$ convolutional encoder with

$$\mathbf{G}(D) = \begin{bmatrix} 1 & 1 & 1+D \\ 0 & D & 1+D^2 \end{bmatrix}$$
 can be realized using

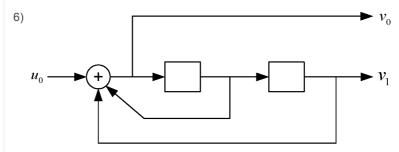
- Controller canonical form realizer
- Observer canonical form realizer
- Both of the above
- Can not be realized

No, the answer is incorrect.

Score: 0

Accepted Answers:

Can not be realized



This is an example of

- Systematic feedback encoder
- Non-systematic feedback encoder
- Systematic feed forward encoder
- Non-systematic feed forward encoder

No, the answer is incorrect.

Score: 0

Accepted Answers:

Non-systematic feedback encoder

7) Weight enumerating function (WEF) of a (2,1,2) convolutional code with

$$G(D) = \begin{bmatrix} 1 & 1 + D^2 \end{bmatrix}$$
 is given by

$$\frac{X^3 - X^4 + X^6}{1 - 2X + X^2 - X^4}$$

$$\frac{X^3 + X^4 - X^6}{1 - 2X - X^2 - X^4}$$

$$\frac{X^3 + X^4 - X^6}{1 - 2X - X^2 + X^3}$$

None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\frac{X^3 - X^4 + X^6}{1 - 2X + X^2 - X^4}$$

8) Input output weight enumeration function (IOWEF) of a (2,1,2) convolutional code with

$$\mathbf{G}(D) = \begin{bmatrix} 1 & 1 + D^2 \end{bmatrix}$$
 is given by

X: weight of k input bits

Y: weight of n coded bits

Z: label of each branch

$$\frac{XY^{3}Z^{3} + X^{2}Y^{4}Z^{4} + X^{2}Y^{6}Z^{4}}{1 + XYZ^{2} + XYZ + X^{2}Y^{4}Z^{3} - X^{2}Y^{2}Z^{3}}$$

$$\frac{XY^{3}Z^{3} + X^{2}Y^{4}Z^{4} - X^{2}Y^{6}Z^{4}}{1 + XYZ^{2} - XYZ + X^{2}Y^{4}Z^{3} + X^{2}Y^{2}Z^{3}}$$

1 point

1 point

1 point

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 $\frac{XY^3Z^3 - X^2Y^4Z^4 + X^2Y^6Z^4}{1 - XYZ^2 - XYZ - X^2Y^4Z^3 + X^2Y^2Z^3}$

None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

 $\frac{XY^3Z^3 - X^2Y^4Z^4 + X^2Y^6Z^4}{1 - XYZ^2 - XYZ - X^2Y^4Z^3 + X^2Y^2Z^3}$

9) Decoding convolutional code using Viterbi algorithm will minimize

1 point

- Bit error rate for convolutional codes
- Frame error rate for convolutional codes
- Both of the above
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Frame error rate for convolutional codes

10BCJR algorithm will minimize

1 point

- Bit error rate for convolutional codes
- Frame error rate for convolutional codes
- Both of the above
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Bit error rate for convolutional codes

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