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Question Paper Code: 42123

M.E. DEGREE EXAMINATION, NOVEMBER 2015

First Semester

Communication Systems

14PCM103 – ADVANCED MODULATION AND CODING

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Choose a linear equalizer by adding a filtered version of pervious symbol estimates to the original filter output
 - (a) Decision feedback equalizer
 - (b) Adaptive equalizer
 - (c) Blind equalizer
 - (d) MMSE equalizer
2. PAPR is expressed in
 - (a) Decibel
 - (b) Hertz
 - (c) Cent
 - (d) None
3. What is the channel capacity of a binary symmetric channel with error probability 0.01?
 - (a) 0.30
 - (b) 0.32
 - (c) 0.16
 - (d) 0.20
4. In TCM-mapping the bits to the constellation points require
 - (a) Set partitioning
 - (b) Ungerboeck partitioning
 - (c) Cyclic partitioning
 - (d) None
5. LDPC codes are also known as
 - (a) Gallegger codes
 - (b) Solomon codes
 - (c) BCH codes
 - (d) None

PART - B (5 x 3 = 15 Marks)

6. State Nyquist pulse shaping criterion for zero ISI.
7. What are the disadvantages of multicarrier OFDM modulation systems?
8. State Shanon's channel capacity theorem.
9. State the features of trellis code.
10. What are the reasons to use an inter-leaver in a turbo code?

PART - C (5 x 16 = 80 Marks)

11. (a) Define and explain the parameters of eye diagram. Mention its usage in digital communication systems. How it is used to know the information about a channel. (16)

Or

- (b) Derive the decision rule for optimum demodulation of digital signal in the presence of ISI and AWGN. (16)
12. (a) Draw the block diagram of a multicarrier OFDM digital communication system and explain the function of each block in detail. (16)

Or

- (b) Write about the following in detail: (i) guard time (ii) cyclic extension (iii) windowing (iv) clipping in OFDM system. (16)
13. (a) A BSC has the error probability $p=0.2$ and the input to the channel consists of 4 equiprobable messages $x_1=000$; $x_2=001$; $x_3=011$; $x_4=111$. Calculate
 - (i) $p(0)$ and $p(1)$ at the input (4)
 - (ii) Efficiency of the code (4)
 - (iii) Channel capacity (8)

Or

- (b) (i) Derive an expression for the capacity of a band-limited AWGN channel. (10)
(ii) Briefly discuss about the sphere packing and random coding bounds. (6)
14. (a) Describe the Ungerboeck partitioning procedure for designing trellis coded modulation for 8 PSK signal constellation. (16)

Or

(b) Design a 4 state TCK codes with the convolutional coder of rate $1/3$ with constraint length 3 and explain why the trellis diagram requires parallel paths in four state PCM. (16)

15. (a) (i) Explain the viterbi decoding algorithm of a convolution encoder of rate $1/2$ with constraint length 2. (10)

(ii) Describe about block and convolutional interleaving. (6)

Or

(b) With suitable examples and diagrams point out the similarities and differences between SOVA and MAP soft decoding algorithm. (16)
