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Paper Id: 233253 **Roll No.** | | | | | | | | | | |

M-TECH
(SEM I) THEORY EXAMINATION 2022-23
ADVANCE DIGITAL COMMUNICATION

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

(a) Explain what is ISI and eye diagram
(b) How is Rayleigh fading characterized
(c) What is need of AWGN channel in digital communication
(d) Define constellation diagram
(e) What is correlative coding
(f) Write advantages of turbo coding
(g) What is Frequency hopping according to IEEE

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

(a) Differentiate Decision feedback equalizer from zero forcing equalizer. Explain the differences.
(b) Develop the modelling framework for phase noise and I-Q imbalances in communication receivers.
(c) A generator matrix for a (6, 3) block code is given below

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

(i) List all the code vectors
(ii) How many errors can be corrected and detected
(d) Explain how synchronization of spread spectrum signals is achieved
(e) Draw the block diagram of OFDM transmitter and receiver. Explain them in detail

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) State and Explain Nyquist criterion.Derive the equation for Nyquist criterion
(b) What is a transversal equalizer? Explain how it can be implemented?

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) With a neat block diagram explain the function of DPSK&MPSK modulators and demodulators.
(b) Classify the types of M - FSK receiver with suitable diagram

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) Consider the generator polynomial for a (7,3) cyclic code defined by

$$g(p) = p^4 + p^3 + p^2 + 1$$

i) Find the encoding table for the cyclic code

ii) What is the minimum distance d_{min} of the code

(b) Explain method for decoding of convolution codes? What is importance of trellis diagram

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) What is spread spectrum techniques? Evaluate performance parameters of DSSS systems

(b) The binary data 001101001 are applied to the input of duobinary system. Find the received output under the case without precoder and with precoder. Suppose the bit at second place is decoded. Construct the receiver output

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Formulate the process of bit and power allocation in multicarrier modulation.

(b) Discuss in detail about optimum and suboptimum detectors in CDMA systems