

M.Tech II Semester Regular Examinations, September 2015**CODING THEORY AND APPLICATIONS****(Digital Electronics & Communication Systems)****Time : 3 Hours****Max. Marks : 60****Note: Answer Any Five Questions. All Questions carry equal marks.**

1. a) State and explain Shanon's first fundamental theorem. (6M)
b) Define Entropy? Also explain what are joint and conditional entropy? (6M)
2. a) Define (n, k) block code. Show that the minimum distance of a linear block code is equal to the minimum weight of its nonzero code words. (6M)
b) Draw the circuit diagram of a $(6, 3)$ systematic Linear Block Code encoder generated using parity check equations $P_0 = U_0 \text{ XOR } U_2$; $P_1 = U_0 \text{ XOR } U_1$; $P_2 = U_1 \text{ XOR } U_2$ (6M)
3. a) Write a note on generalized BCH codes. (6M)
b) The cyclic binary code defined by the generator polynomial $g(x) = x^3 + x^2 + 1$. (6M)
i) Find the minimum distance of the code
ii) Design a systematic encoder for the code.
4. a) Draw the block diagram of general type-II one step majority-logic decoder and explain it. (6M)
b) Draw the block diagram of Trellis Coded modulation system. Discuss various considerations in the design of this modulator system. (6M)
5. a) Describe the convolutional decoding procedure using Viterbi decoding algorithm. (6M)
b) Draw the code tree for $(3, 1, 2)$ code with $L = 5$ and decode the sequence. $r = (010, 010, 001, 110, 100, 101, 011)$. (6M)
6. a) Explain BerlekRmp-messey-sugiyama decoders algorithm. (6M)
b) Write a note on Weight enumerators and Mac-Williams Identities. (6M)
7. a) Discuss the hamming code for 1bit error correction with example. (6M)
b) Derive the channel capacity of a binary symmetric channel. (6M)
8. a) Explain about Iterative coding. (6M)
b) Write a note on:
i) Shortened cyclic codes
ii) Concatenated codes. (6M)