BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.TECH **SEMESTER : I**
BRANCH: IT **SESSION : MO/18**

SUBJECT: IT501 INFORMATION AND CODING THEORY

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Explain mutual information average conditional self-information and entropy. Give examples for each. [4]

Q.1(b) Consider a DMS with eight possible symbols x_i ,i=1,……..,8 and the corresponding probabilities p_1=0.34, p_2= 0.12, p_3=0.07, p_4=0.29, p_5=0.02, p_6= 0.01, p_7=0.11 and p_8=0.04. Find the code words using Huffman coding technique. Also find HCX) and R· [6]

Q.2(a) State and explain channel coding theorem. [6]

Q.2(b) Show that for reliable communication Y ≤ C where Y and C have their own meaning. [4]

Q.3(a) Find the linear span of S = { 12, 21} defined over GF(3) [3]

Q.3(b) Explain parity check matrix in case of linear block code. [3]

Q.3(c) Find a (5,2) systematic code over GF(3). [4]

Q.4(a) Consider the ring F[x]/(x^2+1) defined over GF(2). Is it a field? Justify your answer. [3]

Q.4(b) Find the generator matrices of the codes(4,4) and (4,3) of all codes defined over GF(3)of block length n=4. [3]

Q.4(c) Let us consider all binary codes of block length 7. Find the matrix H corresponding tog(x) = x^3+x^2+1. [4]

Q.5(a) Find the addition table of the Galois field GF(2^3) and Find α^5+ α+1. [3]

Q.5(b) Show that α^3 in GF(2^4) is not a primitive element. [3]

Q.5(c) Construct a double-error-correcting BCH code over GF(2^4). [4]

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