CLASS: M.TECH   SEMESTER : I
BRANCH: IT   SESSION : MO/19

SUBJECT: IT501 INFORMATION THEORY AND CODING

TIME: 3:00 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)   Define mutual information. Explain it for a Binary Symmetric Channel.   [5]
Q.1(b)   Describe Lempel-ZIv coding algorithm and illustrate it for the string 101011011010101011.   [5]

Q.2   Consider the BSC with equal transition probability p. Show that its capability C can be explained as   [10]
         $C=1-H(P)_2$ where $H(p)$ is the entropy.

Q.3(a)   Define linear code. Is the code C={0000,0110,1110,1010} linear? Justify. What is its minimum distance?   [5]
Q.3(b)   Consider C= {0000,0101,1110,1011} and word received is 1010, If there is any error, find the   [5]
         corresponding code word that was sent, using syndrome table.

Q.4(a)   Find all the binary cyclic code of block length 3. Define the Syndrome polynomial $S(x)$ [5]
Q.4(b)   Find the generator matrices of the ternary codes (4,4) and (4,2)   [5]

Q.5(a)   Find the multiplication table of the elements of extended $GF(2^3)$. Find the conjugate elements of any   [5]
         one of this field element.
Q.5(b)   Construct a single error Read -Solomon code with block length 7. Find the codeword corresponding to   [5]
         i=(1 0 α $\alpha^5 \alpha^2$).

::::::29/11/2019::::::E