University Institute of Engineering & Technology

(Recognised Under Section 2(f) and 12B of UGC)

Kurukshetra University, Kurukshetra

TIME – 3 Hrs 15 Min

THEORY EXAMINATION – JAN 2021	
B.TECH – ECE	**SEMESTER – V**

M.M. – 56

PAPER - EC-307

SUBJECT- Information Theory and Coding

INSTRUCTIONS TO BE FOLLOWED

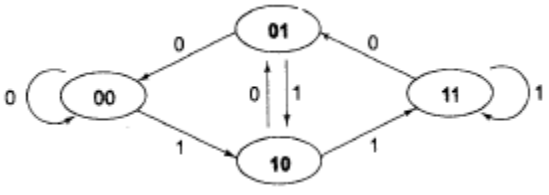
- **Allotted time for examination is 3 hours 15 minutes that includes time for downloading the question paper, writing answers, scanning of answer sheets and E-mailing the PDF files to the designated Email ID.**
- **For ECE-A Regular Students, the Email ID is:- btech5thecea@kuk.ac.in**
- **For ECE-B Regular Students, the Email ID is:- btech5theceb@kuk.ac.in**
- **The candidates will be required to attempt 75% of the question paper (maximum) by choosing to their any best questions accumulating 56 marks.**
- **The PDF files should be saved as Roll No. and Subject Code. Proper attention should be given while sending the email and in the subject line, the Roll Number and Subject Code should be mentioned.**
- **Maximum Page Limit should be 20 (Twenty) for attempting the question paper on A4 sheets which could be downloaded and printed from the sample sheets given in the Kurukshetra University Examination guidelines.**
- **Over-attemptation should be avoided.**
- **Handwriting should be neat and clean and diagrams should be clear and contrasted.**
- **The candidate should not write their Mobile No. otherwise Unfair Means Case will be made.**
- **While attempting the paper, the candidate will use blue/black pen only.**
- **Before attempting the paper, the candidate will ensure that he/she has downloaded the correct question paper. No complaint for attempting wrong question paper by the candidate will be entertained.**
- **Candidate must ensure that he/she has put his/her signature on each page of the answer sheet used by him/her. Answer sheet without the signature of the candidate will not be evaluated.**

PART-A

Q. No. – 1 Answer the following questions. **15x1=15**

(i)	Define relation between uncertainty and information.
(ii)	Calculate entropy of discrete BSC with p (0) =0.5.
(iii)	Decode the following stream Rx = 000100110001000010011100 where A = 00 , B = 010 ,C = 011 and D = 100.
(iv)	For C={00000, 11100, 10110, 10001} corresponding to input i=00,01,10 and 11 respectively Compute output bit stream for input stream given by 0001101100.
(v)	Check whether C = {00,12,21,22,11} is linear code or not over GF(3)
(vi)	For minimum distance d*= 11 of a Linear Block Code find the no. of error it can detect and correct?
(vii)	For a Code C= {00000,11111} if received word is 01011. Compute the decoded symbol as per minimum distance decoding
(viii)	Compute quotient over GF(2) when x^3+x+1 is divided by x^2+1
(ix)	Given g(x)=x^2+2 Generate Cyclic code for input 00 and 12 over GF(3) of block length 4
(x)	For G= [1 0 1 0; 0 1 0 1] the value of g(x) is
(xi)	For ½ convolutional encoder what will be output size of input bitstream 01010101
(xii)	Draw convolutional encoder for G(D) = { D^2+1 D+1}
(xiii)	Differentiate between Symmetric and Asymmetric Encryption.
(xiv)	Define substitution method.
(xv)	Write full form of DES and IDEA.

PART-B

2	Calculate R (Average Number of Bits per Symbol) for given source. Symbol p(A) = 0.5, p(B) = 0.25 and p(C) = 0.25 and Codes are A - 0, B = 110, C = 111 and compare with fixed length code.	**5**
3	Generate all valid generator polynomial for cyclic code, given n=4 over GF(2)	**5**
4	 Draw Trellis Diagram of given state diagram.	**5**
5	Discuss various operations used in encryption.	**5**

PART-C

6	Given a DMS with source probabilities {0.44, 0.21, 0.15, 0.10, 0.06, and 0.04}. i. Compute the entropy of the source ii. Compute fixed length code. iii. Compute the Huffman Code for the source.	**10**

	Compare the efficiency of two codes.	
7	Explain channel coding and channel rate.	**10**
8	Consider the generator polynomial $g(x) = x^2 + 1$ over GF(3) cyclic codes of block length 4. Compute all possible codes for the given polynomial.	**10**
9	Consider the G = [1 0 1 0 0 ; 1 0 0 1 1 ; 0 1 0 1 0] code over GF(2) i. Generate all possible code words. ii. Find parity check matrix H iii. What is the minimum Hamming Distance of the Code? iv. How many errors can this code detect and correct?	**10**
10	Discuss and explain Viterbi Decoding mechanism of Convolution code with the help of example.	**10**
11	For the given Convolutional Encoder G(D) = [D^2+1, D^2+D] a) Generate truth table for Outputs b) Generate complete state diagram c) Generate trellis Diagram d) Encode the bit stream 01010	**10**
12	Explain DES algorithm.	**10**
13	Explain RSA algorithm.	**10**