CONTINUOUS INTERNAL EVALUATION-3

Dept: EC   Sem / Div: V A&B   Sub: Information theory and coding   S Code: 18EC54

Date: 13/01/2021   Time: 2:30-4:00   Max Marks: 50   Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

Q N	Questions	Marks	RBT	COs
	PART A			
1 a	A generator polynomial for a (15,7) cyclic code is $g(x)=1+x^4 + x^6 + x^7 + x^8$ (i) Find the code vector for the message $D(x) = x^2 + x^3 + x^4$ using cyclic encoder circuit. (ii) Draw syndrome calculation circuit and find the syndrome of the received polynomial $Z(x)=1+x+x^3+x^6+x^8+x^9+x^{11}+x^{14}$	10	L3	CO4
b	Consider (2,1,1) convolution encoder, the impulse response for the top-adder is given by $g^{(1)} = 11$ and bottom adder is given by $g^{(2)} = 10$ respectively. (i) Draw state diagram (ii) Draw code tree (iii) Draw trellis diagram and code word for the message 10111.	10	L3	CO4
c	Explain encoding of convolutional codes using transform domain approach.	5	L2	CO4
	OR			
2 a	Consider (15,5) cyclic code generated by polynomial $g(x)=1+x+x^2+x^4+x^5+x^8+x^{10}$ (i) Draw the block diagram of encoder & syndrome calculation circuit. (ii) Find the code polynomial for the message polynomial $D(x) = 1+ x^2 +x^4$	10	L3	CO4
b	Consider the (3, 1, 2) convolutional code with $g^{(1)} = (11\ 0)$, $g^{(2)} = (1\ 0\ 1)$ and $g^{(3)}=(1\ 1\ 1)$ i) Draw the encoder block diagram. ii) Find the generator matrix. iii) Find the code word corresponding to the information sequence (1 1 1 0 1) using time domain approach.	10	L3	CO4
c	Write a Short note on Trellis diagram.	5	L1	CO4
	PART B			
3 a	What are convolutional codes? For a (2, 1, 2) convolutional encoder with generator sequence $g^{(1)} = 111$ and $g^{(2)} = 101$. i) Draw the encoder block diagram. ii) Write the state table iii) Write the state transition table iv) Draw the state diagram. v) Find the generator matrix. vi) Find the code word corresponding to the information sequence (1 1 1 0 1) using transform domain approach	13	L3	CO4
b	For a (7, 4) cyclic code the received vector $Z(x) = 0100101$ and the generator polynomial is $g(x) = 1 + x + x^3$. Draw the syndrome	7	L3	CO4

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calculation circuit and correct the single error in the received vector, also explain operation of circuit.			
c A linear block code for (7,4) is described by a generator polynomial $g(x)=1+x+x^3$ Determine Generator and parity check matrix.	5	L3	CO4
OR			
4 a What are convolutional codes? Consider a (2, 1, 3) convolution encoder, the impulse response for the top-adder is given by $g^{(1)} = 1001$ and bottom adder is given by $g^{(2)} = 1110$ respectively. (i) Draw the corresponding convolution encoder block diagram. (ii) Find the code-word corresponding to the information sequence [10111] using time-domain approach and and transform domain.	12	L3	CO4
b Design an encoder for (7, 4) binary cyclic code generated by G(x) = 1 + x + x³ and verify its operation using message vector (1 0 1 1). Also verify the code obtained using polynomial arithmetic.	6	L3	CO4
c What is binary cyclic code? Describe the features of encoder and decoder used for cyclic codes using an (n-k) bit shift register.	7	L2	CO4

Note: Write internals in A4 sheets and in every page write your name, USN, subject name with your signture. After exam arrange all pages of answer script in single PDF file and Send the answer script to the mail id: nc.vcet@gmail.com

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