K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

suplimentary Exam

Feb-March-2024

(B.Tech) Program: Electronics and Telecommunication Scheme I/II/IIB/III: II	
Examination: TY Semester: V	
Course Code: 1UEXC 501 and Course Name: Digital Communication	

Date of Exam: 27/02/2024	Duration: 2.5 Hours	Max. Marks: 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	What is entropy? Show that the Entropy is maximum when all the messages are equiprobable. Assume M=3.	2	CO1	Ap
ii)	Calculate even parity VRC for the following message bits: 0110	2	CO2	Ap
iii)	Define Error detection and Correction capability with formula	2	CO3	U
iv)	Show that (4,3) Even-parity code is a linear.	2	CO3	Ap
v)	Draw the NRZ and RZ code for the digital data 10110001?	2	CO4	U
vi)	What is Correlator?	2	CO5	U
vii)	Explain Binary and M-ary transmission?	2	CO6	U
viii)	For a bit stream of 011010011 plot the waveforms of: BPSK and QPSK	2	CO6	Ap
Q.2	Solve any four questions out of six.	16		
i)	Compare Analog Modulation with Digital Modulation	4	CO1	Ap
ii)	Define any four parameters: Code word, Code rate, Hamming weight, Hamming distance, Code efficiency and minimum distance.	4	CO2	Ap
iii)	For a (6,3) block code, the received code word is [111011]. Is this codeword correct? If not then correct it using syndrome decoding. The coefficient matrix is given by $$P = \begin{matrix} 0\ 1\ 1 \\ 1\ 0\ 1 \\ 1\ 1\ 0 \end{matrix}$$	4	CO3	Ap

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iv)	Compare Channel Coding and Line Coding	4	CO4	U
v)	Explain Matched filter with impulse response?	4	CO5	U
vi)	Compare BPSK and QPSK	4	CO6	An
Q.3	Solve any two questions out of three.	16		
i)	A discrete memoryless source has an alphabet of five symbol with their probabilities as shown: 	Symbol	M1	M2	M3	M4	M5
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Probability	0.40	0.19	0.16	0.15	0.10 | 1. Construct a Shanon-Fano code for the source and calculate code efficiency and redundancy of the code. 2. Repeat the same for Huffman code. 3. Compare the Huffman and Shannon-Fano code.	8	CO1	Ap
ii)	Explain types of ARQ with diagrams, advantages and disadvantages	8	CO2	Ap
iii)	Generator sequences of a (3, 1, 2) convolutional encoder are given below: $g^{(1)} = 100$, $g^{(2)} = 101$, $g^{(3)} = 111$ Decode the message bits from the received code 101110101000011 using Viterbi's decoding.	8	CO3	Ap
Q.4	Solve any two questions out of three.	16		
i)	Compare line codes Polar RZ, Polar NRZ, Manchester and AMI	8	CO4	U
ii)	State and Explain maximum likelihood decision rule. Explain the function of the correlator receiver.	8	CO5	An
iii)	Explain BFSK Digital modulation technique with modulator, demodulator, waveforms, frequency spectrum, bandwidth, Merits, Demerits and applications	8	CO6	An

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