Subject Code	Subject Name	Teaching Scheme (Hrs.)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
EXC 505	Digital Communication	4	--	--	4	--	--	04

Subject Code	Subject Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Ave. Of Test 1 and Test 2					
EXC 505	Digital Communication	20	20	20	80	--	--		100

Prerequisites: Knowledge of Probability Theory and Signals and Systems

Course Objective:

1. To understand basic Concept of Probability Theory in communication systems.
2. To understand basic concept of Information Theory and Source Coding.
3. To understand Pulse Shaping techniques for optimum transmission of signal.
4. To understand Band pass digital modulation and demodulation (binary and M-level;
5. ASK, PSK and FSK), including their performance in noise.
6. To understand basic concept of channel error correcting codes.
7. To understand basic concept of spread spectrum techniques.

Expected Outcomes:

1. Ability to find nature of random signal and its statistical characteristics.
2. Ability to understand how to make code optimum in containing information generated by source..
3. Ability to find the technique to enhanced the transmission efficiency of the system.
4. Ability to understand different modulation techniques such as bandwidth limited and power limited.
5. Ability to find the technique to combat transmission impairments.
6. Ability to find the modulation technique used in wireless communication..

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Module No.	Unit No.	Topics	Hrs.
1		**Application of Probability Theory in Communication Systems**	07
	1.1	Introduction to digital communication system, significance of AWGN channel, pulse dispersion in the channel	
	1.2	Introduction to probability and sample space , Baye's rule, conditional probability and statistical independence, random variables, probability functions, mean and variance of random variables and sum of random variables	
	1.3	**Probability Models**: Binomial Distribution, Poisson Distribution, Gaussian PDF, Rayleigh PDF and Rician PDF, Central-Limit Theorem	
	1.4	Binary Synchronous Channel(BSC), development of optimal receiver	
2		**Information Theory and Source Coding**	05
	2.1	Measure of Information, Entropy, Information rate, Channel capacity	
	2.2	Capacity of a Gaussian channel, bandwidth, S/N trade-off, Shannon's source coding theorem	
	2.3	Coding to increase the average information per bit, Huffman coding, Lempel Ziv coding, examples and applications of source coding	
3		**Pulse Shaping for Optimum Transmission**	08
	3.1	Line codes and their desirable properties, PSD of digital data.	
	3.2	**Baseband PAM transmission**: Concept of inter channel and inter symbol interference, eye pattern	
	3.3	Concept of equalizer to overcome ISI, Nyquist's Criterion for distortion less transmission	
	3.4	Duo-binary encoding and modified duo-binary encoding	
4		**Digital Modulation Techniques**	15
	4.1	Digital modulation formats, coherent and non- coherent reception	
	4.2	**Binary modulation techniques:** BPSK, BFSK , BASK	
	4.3	**M-ary Modulation techniques:** QPSK, M-ary PSK, MSK , M-ary FSK, M-ary QAM, Differential encoded BPSK & D-QPSK	
	4.4	**Optimal Reception of Digital Data**: A baseband signal receiver and its Probability of error	
	4.5	Optimum receiver and its transfer function, matched filter and its properties	
5		**Error Control Codes**	12
	5.1	Need for channel encoding, discrete memory-less channel , redundancy, code rate ,code efficiency and hamming bound	
	5.2	Linear block codes, cyclic codes, block interleaving	
	5.3	**Convolution codes**: State diagram, code tree, trellis diagram	
	5.4	Decoding of Convolutional codes using Viterbi algorithm	
6		**Spread Spectrum Modulation**	05
	6.1	Need for spread spectrum modulation, pseudo noise sequence generation, direct-sequence spread spectrum (DSSS)	
	6.2	Processing gain and jamming margin, frequency–hop spread spectrum (FHSS)	
	6.3	**Application of spread spectrum :** DS-CDMA	
		Total	52

Recommended Books:

1. Simon Haykin, "*Communication System*", John Wiley And Sons ,4th Ed
2. Taub Schilling And Saha, "*Principles Of Communication Systems*", Tata Mc-Graw Hill, Third Ed
3. Amitabha Bhattacharya, "*Digital Communication*", Tata Mcgraw Hill
4. Lan A. Glover and Peter M. Grant, "*Digital Communications*", Pearson, 2nd Ed.
5. John G. Proakis, "*Digital Communications*", Mcgraw Hill , 5th Ed

Internal Assessment (IA):
Two tests must be conducted which should cover at least 80% of syllabus. The average marks of both the tests will be considered as final IA marks

End Semester Examination:
1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.
3: Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 5 marks will be asked.
4: Remaining questions will be selected from all the modules.

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