NAGARJUNA COLLEGE OF ENGINEERING AND TECHNOLOGY
NAAC Accredited with "A+" grade
Autonomous Institute under Visvesvaraya Technological University (VTU)

DEPARTMENT OF Electronics & Communication Engineering

COURSE PLAN
(To be submitted before commencement of semester)

Course Name: Digital Communication	**Course Code:** 21ECI51		
Course Credits: 3:0:0:0	**Course L:T:P:** 3:0:0:0	**Semester: 5**	
Course Teacher/s: Dr. H. Venkatesh Kumar Dr. Vivek Singh	**Academic Year:** 2023-24		
Lab. Instructors (if applicable): Mr.	**Date of Commencement of Class: 20/11/2023**		

COURSE DESCRIPTION:

The purpose of any communication system is to transfer information from one place to another. Noise limits our ability to communicate, digital communication system have better immunity towards noise compare to other system. Module 1 deals with Base Band Shaping for Data Transmission principles and also discusses about different line coding techniques to represent digital data. The Model 2 discusses about Digital Modulation Techniques and its probability error calculations, optimum design in digital communication system. The Model 3 deals with different performance evaluation using constellation diagram. The model 4 attempts to achieve secured communication by designing digital signals for spread spectrum. The model 5 deals with design of digital communication systems of transmission for Multi-user Systems

PREREQUISITES (if Any):
          Analog Communication, Analog Electronics. Signals and Systems.

LECTURE PLAN:

Topic	Topic Details	Lecture No.	Week	Text Book / Reference Books	Percentage of Syllabus coverage
Module-I	Base Band Shaping for Data Transmission: Discrete PAM signals (Line Codes).	1	Week-1	T1, T2,	**20%**
	power Spectral density (PSD) of line codes: NRZ unipolar format.	2	Week-1	T1, T2,	
	NRZ polar format.	3	Week-1	T1, T2,	
	NRZ bipolar format.	4	Week-2	T1, T2,	
	Manchester format.	5	Week-2	T1, T2,	
	Baseband Transmission of binary data.	6	Week-2	T1, T2,T3	
	Inter symbol Interference (ISI).	7	Week-3	T1, T2,T4	
	Eye pattern, adaptive	8	Week-3	T1, T2,	

	equalization.				
	Cumulative Coverage				**20%**
Module II	**Digital Modulation Techniques** :Phase shift Keying techniques using coherent detection: generation, detection	9	Week-4	T1, T2,	**20%**
	Error probabilities of BPSK and	10	Week-4	T1, T2,	
	Quadrature Phase Shift Keying (QPSK) Modulation and Detection.	11	Week-4	T1, T2,	
	Frequency shift keying techniques using Coherent detection: BFSK generation, detection	12	Week-5	T1, T2,	
	Error probability - Frequency shift keying	13	Week-5	T1, T2,	
	Non coherent modulation technique-DPSK Modulation, Receiver	14	Week-5	T1, T2,	
	Introduction to minimum Shift Keying (MSK)	15	Week-6	T1, T2,	
	Gaussian Minimum Shift Keying (GMSK).	16	Week-6	T1, T2,	
	Cumulative Coverage				**40%**
AAT 1	Quiz		Week-6		
Module III	Signaling Communication through Band Limited AWGN Channels: Signaling over AWGN Channels.	17	Week-6	T1, T2,	**20%**
	Introduction, Geometric representation of signals.	18	Week-6	T1, T2,	
	Gram- Schmidt Orthogonalization procedure.	19	Week-7	T1, T2,	
	Conversion of the continuous AWGN channel into a vector channel (without statistical characterization).	20	Week-7	T1, T2,	
	Optimum receivers using coherent detection:	21	Week-7	T1, T2,	
	ML Decoding.	22	Week-8	T1, T2,	
	Correlation receiver.	23	Week-8	T1, T2,	

	Matched filter receiver.	24	Week-8	T1, T2,	
	Cumulative Coverage				**60%**
Module IV	Spread Spectrum Modulation: Introduction and definition.	25	Week-9	T1, T2,	**20%**
	pseudo-noise sequence generation.	26	Week-9	T1, T2,	
	properties of maximum-length sequences.	27	Week-9	T1, T2,	
	Direct sequence spread spectrum (DS-SS)-base band-based transmitter and receiver,	28	Week-10	T1, T2,	
	Processing gain, Probability of error (statement only), Jamming margin.	29	Week-10	T1, T2,	
	Frequency- hop Spread Spectrum: Slow Frequency Hopping.	30	Week-10	T1, T2,	
	Fast frequency Hopping.	31	Week-10	T1, T2,	
	Comparison between slow frequency and fast frequency hopping.	32	Week-11	T1, T2,	
	Cumulative Coverage				**80%**
AAT2	**Surprise Test**		Week-11		
Module V	Multi-user Systems: Introduction,	33	Week-11	R4 ,R5,	
	Multiuser Channels: The Uplink model.	34	Week-12	R4 ,R5,	
	Multiuser Channels: The Downlink model.	35	Week-12	R4 ,R5,	
	Multiple Access: Frequency division multiple Access (FDMA),	36	Week-12	R4 ,R5,	
	Time Division Multiple Access (TDMA),	37	Week-12	R4 ,R5,	
	Code division Multiple Access(CDMA),	38	Week-13	R4 ,R5,	
	Space Division Multiple Access(SDMA),	39	Week-13	R4 ,R5,	**20%**
	Hybrid Techniques.	40	Week-13	R4 ,R5,	
AAT-3	**Seminar**		Week-13		
	Cumulative Coverage				**100%**

TEXTBOOKS AND REFERENCE BOOKS:

Book Type	Code	Title & Author	Publication Information		
			Edition	Publisher	Year
Text Books	**T1**	Simon Haykin, "Digital Communication".	Fourth Edition	John Wiley & sons	2014
	T2	John G Proakis and Masoud Salehi, "Fundamentals of Communication Systems"	Third Edition	Pearson Education	2014
	T3	K Sam Shanmugam, "Digital and analog communication systems".	Second Edition	John Wiley India Pvt. Ltd,	1996
Reference Books	**R4**	Bernard Sklar, "Digital Communications Fundamentals and Applications"	Second Edition	Pearson Education,	2016,
	R5	Andrea Goldsmith, "Wireless Communication ".	Fourth Edition	Cambridge University Press. Edition	2005

COURSE OUTCOMES:

At the end of the course the student will be able to:

CO1	Understand the concepts of Base Band shaping Technique for data transmission.
CO2	Analyze different digital modulation techniques and choose the appropriate modulation technique for the given specifications.
CO3	Illustrate the symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
CO4	Evaluate the spread spectrum modulation schemes and compute the performance parameters of communication system.
CO5	Interpret the need for Multi-user and Multiple-access Systems.

CO-PO MAPPING:

POS COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C301.1	3	3	2	2	1	-	-	-	-	-	-	1	3	2	1
C301.2	3	3	2	2	2	-	-	-	-	1	-	1	3	2	1
C301.3	3	3	3	2	-	-	-	-	-	-	-	1	3	2	1
C301.4	3	3	2	2	2	-	-	-	-	1	-	1	3	2	1
C301.5	3	3	3	3	-	1	-	-	-	1	-	1	3	2	1

COURSE EVALUATION SCHEME:

	Component		Weightage (%)	
CIE's	CIE 1- At the end of 5th week	20		60
	CIE 2 - At the end of 10th week	20		
	CIE 3 - At the end of 15th week	20		
AAT's	AAT-1- At the end of 4th week	10		40
	AAT-2- At the end of 9th week	10		
	AAT-3- At the end of 13th week	20		
	Continuous Internal Evaluation Total Marks: 100. Reduced to 50 Marks			
	Semester End Examination (SEE) Total Marks: 100. Reduced to 50 Marks			

1.Dr. H. Venkatesh Kumar
2.Dr. Vivek Singh
Signature of the Course Co-Ordinator   **Signature of the HOD**

Date: