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COURSE PLAN

Subject code: EC 8491	**Branch/Year/Sem/Section: B.E ECE/II/IV**
Subject Name: COMMUNICATION THEORY	**Batch:2018-2022**
Staff Name: R.KUTTIMANI	**Academic year:2019-2020**

COURSE OBJECTIVE

- Design AM communication systems
- Design Angle modulated communication systems
- Apply the concepts of Random Process to the design of Communication systems
- Analyze the noise performance of AM and FM systems and gain knowledge in sampling and quantization

TEXT BOOK:

T1. J.G.Proakis, M.Salehi, ―Fundamentals of Communication Systems‖, Pearson Education 2014. (UNIT I-IV)

T2. Simon Haykin, ―Communication Systems‖, 4th Edition, Wiley, 2014.(UNIT I-V) T3. Shibu. K.V, "Introduction to Embedded Systems", 2e, Mc graw Hill, 2017.

REFERENCES:

R1. B.P.Lathi, - Modern Digital and Analog Communication Systems‖, 3rd Edition, Oxford University Press, 2007.

R2. D.Roody, J.Coolen, ―Electronic Communications, 4th edition PHI 2006.

R3. A.Papoulis, ―Probability, Random variables and Processes‖, McGraw Hill, 3rd edition, 1991.

R4. B.Sklar, Digital Communications Fundamentals and Applications‖, 2nd Edition Pearson Education 2007

R5. H P Hsu, Schaum Outline Series - ―Analog and Digital Communications‖ TMH 2006

WEB RESOURCES

W1: https://www.google.com/explained.html

W2: http://nptel.ac.in/courses/10810505/pdf/lesson-2.pdf

TEACHING METHODOLOGIES:

- BB - BLACK BOARD
- PPT - POWER POINT PRESENTATION

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC8491	COMMUNICATION THEORY	L	T	P	C
		3	0	0	3

UNIT I AMPLITUDE MODULATION **9**

Amplitude Modulation- DSBSC, DSBFC, SSB, VSB - Modulation index, Spectra, Power relations and Bandwidth – AM Generation – Square law and Switching modulator, DSBSC Generation – Balanced and Ring Modulator, SSB Generation – Filter, Phase Shift and Third Methods, VSB Generation – Filter Method, Hilbert Transform, Pre-envelope & complex envelope –comparison of different AM techniques, Superheterodyne Receiver

UNIT II ANGLE MODULATION **9**

Phase and frequency modulation, Narrow Band and Wide band FM – Modulation index, Spectra, Power relations and Transmission Bandwidth - FM modulation –Direct and Indirect methods, FM Demodulation – FM to AM conversion, FM Discriminator - PLL as FM Demodulator.

UNIT III RANDOM PROCESS **9**

Random variables, Random Process, Stationary Processes, Mean, Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter.

UNIT IV NOISE CHARACTERIZATION **9**

Noise sources – Noise figure, noise temperature and noise bandwidth – Noise in cascaded systems. Representation of Narrow band noise –In-phase and quadrature, Envelope and Phase – Noise performance analysis in AM & FM systems – Threshold effect, Pre-emphasis and de- emphasis for FM.

UNIT V SAMPLING & QUANTIZATION **9**

Low pass sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Logarithmic Companding –PAM, PPM, PWM, PCM – TDM, FDM.

TOTAL: 45 PERIODS

Topic No	Topic Name	Books For reference	Page No	Teaching Methodology	No of periods required	Cumulative periods
UNIT I	**AMPLITUDE MODULATION**					**(9)**
1.	Amplitude Modulation	T1	1-40	BB	1	1
2.	DSBSC, DSBFC	T1	88-93	BB	1	2
3.	SSB, VSB	T1	94-98	BB	1	3
4.	AM Generation – Square law and Switching modulator	T1	98-100	BB	1	4
5	DSBSC Generation – Balanced and Ring Modulator	T1	100-101	BB	1	5
6	SSB Generation – Filter, Phase Shift and Third Methods	T1	106-109	BB	1	6
7	VSB Generation – Filter Method, Hilbert Transform	T1	112-119	BB	1	7
8	Pre-envelope & complex envelope	T1	119-128	BB	1	8
9	comparison of different AM techniques, Superheterodyne	T1	128-129	BB	1	9
LEARNING OUTCOME: **At the end of unit , the students will be able to** • Know the fundamentals of Modulation • Understand the concept of DSB and SSB • Define the types of receivers						
UNIT II	**ANGLE MODULATION**					**(9)**
10	Phase and frequency modulation	T1	107-109	BB	1	10
11	Narrow Band and Wide band FM	T1	109-111	BB	1	11
12	Modulation index, Spectra, Power relations and Transmission	T1	111-113	BB	1	12
13	FM modulation	T1	113-115	BB	1	13
14	Direct and Indirect methods, FM Demodulation	T1	117-119	BB	1	14
15	FM to AM conversion	T1	120-122	BB	1	15

16	FM Discriminator	T1	123-124	BB	1	16
17	PLL	T1	124-126	BB	1	17
18	FM Demodulator	T1	126-132	BB	1	18

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of angle Modulation
- Define Communication.

UNIT – III RANDOM PROCESS (9)

19.	Random variables	T1	708-710	BB	1	19
20.	Random Process	T1	33-34	BB	1	20
21.	Stationary Processes	T1	55-56	BB	1	21
22.	Mean, Correlation	T1	35-41	BB	1	22
23	Covariance functions	T1	44-54	BB	1	23
24.	Power Spectral Density	T1	41-42	BB	1	24
25.	Ergodic Processes	T1	54-56	BB	1	25
26	Gaussian Process	T1	56-58	BB	1	26
27	Transmission of a Random Process Through a LTI filter	T1	42-44	BB	1	27

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of Random process
- Gain knowledge about Gaussian
- Define ergodic.

UNIT IV	NOISE CHARACTERIZATION					(9)
28	Noise sources bandwidth	T1	523-524	BB	1	28
29	Noise figure	T1	524-525	BB	1	29
30	Noise temperature and noise	T1	525-526	BB	1	30
31	Noise in cascaded systems.	T1	526-528	BB	1	31
32	Representation of Narrow band	T1	64-66	BB	1	32
33	In-phase and quadrature, Envelope and Phase	T1	251-253	BB	1	33
34	Noise performance analysis in AM & FM systems	T1	135-136	BB	1	34
35	Threshold effect	T1	148-149	BB	1	35
36	Pre-emphasis and de- emphasis for FM	T1	294-297	BB	1	36

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the concept of Noise.
- Known about white noise
- Get the knowledge about characterization of noise

UNIT V	SAMPLING & QUANTIZATION					(9)
37	Low pass sampling	T1	109	BB	1	37
38	Aliasing	T1	147	BB	1	38
39	Signal Reconstruction	T1	143-146	BB	1	39
40	Quantization	T1	193-197	BB	1	40
41	Uniform & non-uniform quantization	T1	172-180	BB	1	41
42	quantization noise	T1	162-163	BB	1	42

43	Logarithmic Companding PAM, PPM,	T1	190-193	BB	1	43
44	PWM, PCM	T1	193-195	BB& PPT	1	44
45	TDM, FDM	T1	163-165	BB& PPT	1	45

LEARNING OUTCOME:

At the end of unit , the students will be able to

- Understand the Sampling
- Know about the concept of Quantization
- Understand the concept of rounding and truncation.

COURSE OUTCOME

At the end of the course, the student should be able to:

- Design AM communication systems
- Design Angle modulated communication systems
- Apply the concepts of Random Process to the design of Communication systems
- Analyze the noise performance of AM and FM systems

CONTENT BEYOND THE SYLLABUS

ALIASING EFFECT and AVOIDANCE

CONTINUES INTERNAL ASSESSMENT DETAILS

ASSESMENT NUMBER	I	II	MODEL
TOPIC NO.(UNIT)	1-18 (1st & 2nd units)	19-36 (3rd & 4th units)	1-45 (units 1-5)

ASSIGNMENT DETAILS

ASSIGNMENT NUMBER	I	II	III
TOPIC NUMBER FOR REFERENCE	1-18 (1st & 2nd units)	19-36 (3rd & 4th units)	1-45 (units 1-5)
DEAD LINE			

ASSIGNMENT NUMBER	BATCH	DESCRIPTIVE QUESTIONS/TOPIC (Minimum of 8 Pages)
I	B1	Frequency modulation

II	B1	Wide sense stationary process
III	B1	Reconstruction of Sampling

PREPARED BY **VERIFIED BY**

R.KUTTIMANI, AP/ECE **HOD/ECE**

APPROVED BY

PRINCIPAL