

RAGHU ENGINEERING COLLEGE (Autonomous)

(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUGV, Vizianagaram) NBA and NAAC 'A+' grade accredited Institute.

Dakamarri, Bheemili Mandal, Visakhapatnam – 531162, A.P.

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INSTITUTE VISION

Envisioning to be a world class technical institution by synergizing quality education with ethical values.

INSTITUTE MISSION

- To encourage training and research in cutting-edge technologies.
- To develop and strengthen strategic links with the industry.
- To kindle the zeal among the students and promote their quest for academic excellence.
- To encourage extra-curricular activities along with good communication skills.

QUALITY POLICY

RAGHU Engineering College underscores ethical values along with innovative teaching through an interactive, activity-based pedagogy; establishes the best of infrastructural facilities, inculcates engineering temper among the students through the use of the latest Information and Communication Technologies, and strives for an efficient, responsive and transparent administration in all areas.

Department of Electronics and Communication Engineering

VISION

To grow into a premier engineering department with excellence in teaching, research, and innovation in the field of electronics and communication engineering at par with the global industrial standards catering to the needs of the stakeholders while keeping up with the advancing technology.

MISSION

- M1: To provide excellence in education, research and public services.
- M2: To provide a creative environment through structured teaching and learning process.
- M3:To impart employability-focused education while imbibing the spirit of entrepreneurship.
- M4: To inculcate self-learning attitude, management skills and professional ethics.

PROGRAMME EDUCTIONAL OBJECTIVES (PEOs)

- **PEO 1: Domain Knowledge:** To have the knowledge and technical skills required to remain productive.
- **PEO 2: Communication Skills & Employability:** To apply technical knowledge and skills as electronics and communication engineers to provide practical solutions in industrial and governmental organizations.
- **PEO 3: Life Long Learning & Social Concern: -** To achieve success with awareness of entrepreneurship skills and have the ability for lifelong learning by pursuing professional development to meet the emerging and evolving demands for a successful career.

MAPPING OF MISSION STATEMENTS WITH PEOS

MS/ PEOs	PEO 1	PEO 2	PEO 3
MS 1	3	2	2
MS 2	3	3	2
MS 3	3	2	3
MS 4	2	3	3

1-Slight, 2- Moderate, 3- Substantial

	PROGRAM OUTCOMES						
	Graduates of Electronics and Communication Engineering Will:						
PO 1	Engineering knowledge : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.						
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.						
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.						
PO 4	Conduct investigations of complex problems : Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.						
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.						

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PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to								
	assess societal, health, safety, legal and cultural issues and the consequent								
	responsibilities relevant to the professional engineering practice.								
PO 7	Environment and sustainability: Understand the impact of the professional								
	engineering solutions in societal and environmental contexts, and demonstrate the								
	knowledge of, and need for sustainable development.								
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities								
	and norms of the engineering practice.								
PO 9	Individual and team work: Function effectively as an individual, and as a member or								
	leader in diverse teams, and in multidisciplinary settings.								
PO 10	Communication: Communicate effectively on complex engineering activities with the								
	engineering community and with society at large, such as, being able to comprehend								
	and write effective reports and design documentation, make effective presentations, and								
	give and receive clear instructions.								
PO 11	Project management and finance: Demonstrate knowledge and understanding of the								
	engineering and management principles and apply these to one's own work, as a								
	member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to								
	engage in independent and life-long learning in the broadest context of technological								
	change.								
	PROGRAM SPECIFIC OUTCOMES (PSOs)								
PSO 1 : U	Inderstand and apply the fundamental concepts of Basic and Engineering Sciences for								
appropria	te up-skilling in the fast-emerging fields of Signal Processing, Image Processing,								
Commun	ication, Networking, VLSI, Embedded Systems, Analog and Digital Technologies to								
meet the	futuristic industrial achievements.								
PSO 2 : A	pply latest hardware and software tools to solve complex electronics and communication								
engineeri	ng problems along with analytical skills to derive appropriate solutions in the real time								
applicatio	ons across varied business and administrative functions.								

Mapping of PEOs with POs and PSOs

PEO/ POs	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2
PEO 1	3	3	3	2	2						1	1	3	1
PEO 2	2	3	3	2			2	2		3			3	3
PEO 3						1	1	1	1	2	1	3	3	1

1-Slight, 2- Moderate, 3- Substantial

	23041	05-Signals	s & Systems						
Programme &Branch	B. Tech & ECE	Sem	L	Т	Р	Credits			
Prerequisites	Linear Algebra and Calculus, Differential Equations & Vector Calculus	4	Professional Core	3	0	0	3		
Course Object	tives:	I	•	1			1		
1. To und	erstand the fundamental cha	racteristics	s of signals and s	systems					
2. To anal	yze the spectral characterist	tics of signation	al using Fourier	series a	and Four	ier trar	nsforms.		
3. To anal	yze continuous time signals	and syster	ns using Laplac	e transf	orms.				
4. To Cha	racterize LTI systems in tim	ne and freq	uency domain						
5. To solv	e problems involving convo	olution, cor	relation, filterin	g and sa	ampling	techni	ques.		
	distance, position, temperature, pressure etc., and represents some variable of interest associated with system. The objective of signal processing is to extract information from signal. Signal processing is concerned with representing the signal in mathematical terms and extracting the information by carrying out the algorithmic								
Course Conte	nts:								
Unit-1	Introduction to signals a	nd system	S		Contac	t Hour	rs: 9		
Definition of S	jonals and Systems Classif	ication of S	Signals Classifi	cation of	of Syster	ns On	erations of		
signals: time-sl	hifting time-scaling amplit	ude-shiftir	og amplitude-sc	aling F	Problems	on cla	assification		
and characteris	stics of Signals and System	s. Compley	x exponential ar	nd sinus	soidal si	enals.	Singularit		
functions and 1	related functions: impulse f	unction. ste	ep function. sign	num fui	nction ar	nd ram	p functior		
Signal Analysi	is: Analogy between vectors	and signa	ls, orthogonal si	gnal spa	ace, Sigr	al app	roximatio		
using orthogo	nal functions, Mean square	e error, cl	osed or comple	ete set	of ortho	ogonal	functions		
Orthogonality	in complex functions.	,	1			U			
Unit-2	Fourier series and Fouri	er transfo	rms		Contac	t Hour	rs: 9		
Fourier series	• Representation of Fourier	series Diri	chlet's conditio	ns Trio	Ionometi	ic Fou	rier Series		
Exponential Ec	urier Series Fourier spectru	im Proper	ties of Fourier s	eries	,onomen	10 1 00			
Fourier transf	forms: Introduction Fourier	transform	of standard sign	als. For	irier tran	sform	of arbitrar		
signals. Proper	ties of Fourier transform In	verse Four	ier transform				or around		
Unit-3	Jnit-3 Laplace Transforms Contact Hours: 9								
Introduction E	elation between FT & IT	Fristence	of Lanlace Tre	ansform	Regio	n of c	nvergeng		
(ROC) I anlag	e transform for standard sig	$\frac{1}{2}$	ROC Propertie	ansion as of Pr	$\frac{1}{1}$	n of co	of Laplac		
transform Inv	erse Lanlace transform P	200 for x	various signals	Tranef	$\sum_{i=1}^{n} f_{i}$	ion S	olution (
differential equ	lations using Laplace transf	form, pole-	zero locations,	stability	y Analys	is of C	CT system		
using Laplace'	Iransform								

Unit-	-4	Analysis of Linear Systems	Contact Hours: 9							
Linea Linea Graph linean Ideal	ar system, ar time va hical repro r systems. LPF, HPP	Impulse response, Response of a linear system, Linear tim riant (LTV) system, Concept of convolution in time domai esentation of convolution, Transfer function of a LTI system Distortion less transmission through a system, Signal bandw F and BPF characteristics, Causality and Poly-Wiener criterio	e invariant (LTI) system, n and frequency domain, n. Filter characteristics of width, System bandwidth, n for physical realization,							
Unit-	Unit-5Correlation & Sampling TheoremContact Hours: 9									
Correl Energ correl Extra Samp Impu under	 Correlation: Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering. Sampling Theorem: Graphical and analytical proof for Band Limited Signals, Sampling Techniques: Impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling. 									
			Total Hours: 45							
1	Books: Signals a Edition, 1	nd Systems – A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PH 997.	I, Second							
2	Signals, S	Systems & Communications – B.P. Lathi, BS Publications, 2003.								
3	Signals &	z Systems - Simon Haykin and Van Veen, Wiley, Second Edition, 2	2007.							
Refe	rence Boo	ks:								
1	Principle	s of Linear Systems and Signals – BP Lathi, Oxford University Pre	ss, 2015							
2	Fundame	ntals of Signals and Systems-Michel J. Robert, McGraw Hill, 200	8.							
3	Signals and Systems – P. Ramesh Babu and R. Ananda Natarajan, Scitech Publications, Third Edition, 2004									
Web	Referenc	es:								
1	https://ww	ww.youtube.com/watch?v=up55tuwestg&list=PLWPirh4EWFpHr_	1ZCkuF9ToYUrmujv9Aa							
2	https://w	ww.tutorialspoint.com/signals_and_systems/index.html								
3	https://w YTaebre	ww.youtube.com/watch?v=Zk7Drkpb2HA&list=PLULQVv2	ZuQOEaol2hHExJiPq6D							

COURS Upon co	SE OUTCOMES: ompletion of the course, students shall have ability to	BT Mapped (Highest Level)
CO 1	Define the concepts of signals and systems using linear algebra.	L1
CO 2	Analyze spectral characteristics of continuous-time signals using Fourier series and Fourier transforms.	L4
CO 3	Analyze continuous time signals and systems using Laplace transform.	L4
CO 4	Classify systems and determine the response of LTI system using convolution.	L4
CO 5	Understand the process of sampling and the effects of under sampling and correlation.	L2

Mapping of Cos with POs and PSOs:

COs/POs	PO	PO	PO	PSO	PSO									
	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-1	-2
CO 1	2	1	-	-	-	-	-	-	-	-	-	-	3	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO 3	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO 4	3	1	-	1	-	-	-	-	-	-	-	-	3	-
CO 5	3	1	-	1	-	-	-	-	-	-	-	-	3	-
1 – Slight, 2 – Moderate, 3 – Substantial														

	ASSESSMENT PATERN - THEORY										
TEST	Remembering (K1)%	Understanding (K2)%	Applying (K3)%	Analyzing (K4)%	Evaluating (K5)%	Creating (K6)%	Total%				
MID-1	30	30	40				100				
MID-2	20	20	30	30			100				
SEE	20	30	30	20			100				
*± 3% m	* \pm 3% may be varied										