

Mohgaon, Wardha Road, Nagpur - 441 108

### An Autonomous Institute



DEPARTMENT OFELECTRONICS & COMMUNICATION ENGINEERING

### **B.Tech. Electronics & Communication** Engineering

# **Syllabus**

## From

## Academic Year 2022-23

### Tulsiramji Gaikwad-Patil College of Engineering & Technology, Nagpur

(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur) **Programme: Electronics & Communication Engineering** 

Scheme of Instructions: Second Year B.Tech. in Electronics & Communication Engineering

**EXAM SCHEME** Course Course Course Sr. Contact **Course Title** Т Р L Hrs/Wk Credits No. Category Code **CT-1 CT-2** TA/CA ESE TOTAL PCC BEC2401 Signals & Systems 3 3 3 15 15 10 60 100 \_ PCC Electromagnetic Theory 3 3 3 15 15 2 **BEC2402** 10 60 100 -\_ Analog Circuit Design 3 3 3 3 PCC BEC2403 15 15 10 60 100 \_ Microprocessor & PCC BEC2404 3 3 3 15 15 10 60 100 4 \_ -Microcontroller Human Values for Professional 3 3 **BSH2301** 3 15 15 10 60 100 5 HSMC \_ \_ Ethics Signals & Systems Lab 2 2 PCC 1 6 BEC2406 25 25 50 \_ \_ -\_ Microprocessor & 7 PCC **BEC2407** 2 2 1 25 25 50 \_ \_ \_ Microcontroller Lab Analog Circuit Design Lab 2 8 PCC **BEC2408** 2 1 25 25 50 \_ \_ \_ \_ 2 2 25 25 50 9 PROJ **BEC2409** Micro Proiect 1 \_ \_ \_ Group Reading of Classics 2 2 Audit 10 MCC **BAU2410** \_ \_ \_ \_ \_ \_ \_ Total 17 08 25 19 75 75 150 400 700 -**P-Practical T**-Tutorial L- Lecture

Semester – IV

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2

ESE- End Semester Examination (For Laboratory End Semester performance)

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Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Engg. (Basic Sc.) Sc.)		PCC (Programme Core Courses)	PEC (Programme Elective Courses)	OEC (Open Elective courses from other discipline)	Project / Seminar /Industrial Training
Credits	3	-		15			01
Cumulative Sum	5	21	24	12			-

#### **PROGRESSIVE TOTAL CREDITS : 59+19 = 78**

Prov. TANKS BOS Chairman

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MCC (Mandatory Courses)

Yes

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Second Year (Semester-IV) B.Tech. Electronics & Communication Engineering

<b>BEC2401</b>	: SIGNALS	AND	SYSTEMS
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Teaching Scheme		<b>Examination Sc</b>	heme
Lectures	3 Hrs/week	CT-1	15 Marks
Tutorial	0 Hrs/week	CT-2	15 Marks
<b>Total Credit</b> 3		ТА	10 Marks
		ESE	60 Marks
		Total	100 Marks
		Duration of ESE:	03 Hrs 00 Min.

**Course Outcomes (CO)** 

Students will be able to

Determine the responses and Classification of Signals and systems.

Explain LTI system based on impulse response Using Convolution theorem

Analyze spectral characteristics of continuous-time Periodic and Aperiodic signals using Fourier Series and Transform.

**Examine** sampling and interpolation to sample and reconstruct signals.

Illustrate the Laplace and Z transform to evaluate the continuous-time and discrete-time signals and systems. Course Contents

Unit I	<b>CONTINUOUS-TIME, AND DISCRETE-TIME SIGNALS AND SYSTEMS:</b> Signals, Signal Energy and Power, Transformations of the Independent Variable, Periodic Signals, Even and Odd Signals, Exponential and Sinusoidal Signals, Complex Exponential and Sinusoidal Signals, Unit Impulse and Unit Step Functions, Systems and Properties
Unit II	<b>LINEAR TIME-INVARIANT SYSTEMS:</b> LTI Systems: The Convolution Integral/ Sum, The Unit Impulse, The Representation of Signals in Terms of Impulses, The Unit Impulse Response, Representation of LTI Systems, Properties of LTI Systems.
Unit III	CONTINUOUS AND DISCRETE-TIME FOURIER SERIES AND FOURIER TRANSFORM: The Response of LTI Systems to Complex Exponentials, Fourier Series Representation, Linear Combinations of Harmonically Related Complex Exponentials, Determination of the Fourier Series Representation, Convergence of the Fourier Series, Properties, Parseval's Relation. Representation of Aperiodic Signals: Fourier Transform, Convergence of Fourier Transforms, Properties.
Unit IV	<b>TIME AND FREQUENCY CHARACTERIZATION OF SIGNALS AND</b> <b>SYSTEMS:</b> The Magnitude-Phase Representation of the Fourier Transform, Frequency Response of LTI Systems, Linear and Nonlinear Phase, Group Delay, Time-Domain Properties of Ideal Frequency Selective Filters. Representation of a Continuous-Time Signal by Its Samples: The Sampling Theorem and Reconstruction of a Signal from its Samples Using Interpolation.
∐nit V	THE LAPLACE AND Z-TRANSFORM Region of Convergence Inverse Laplace Transform Geometric Evaluation of the

**Unit V** Region of Convergence, Inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties, Analysis, Characterization of

	LTI Systems, Interconnections and realization of Discrete systems.
<b>Text Books</b>	
1	A.V. Oppenheim, A.S. Wilsky and H. Nawab S, "Signals & Systems", Prentice-Hall, 2005
2	Lathi, B. P., and R. A. Green. Linear Systems and Signals. 2018.
3	Signals & Systems Analysis Using Transformation - 1st edition 2003. Robert McGraw-Hill
<b>Reference Be</b>	ooks
1	Rodger E Zaimer and William H Tranter, "Signals & Systems – Continuous and Discrete", McMillan Publishing Company, Bangalore, 2005.
2	John .G.Proakis, "Digital Signal Processing Principles, Algorithms and Applications, Prentice Hall, New Delhi 2006,.
3	Sanjit .K. Mitra "Digital Signal Processing A Computer based approach" 'Tata
	McGrawHill Edition, New Delhi, 2001,
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc21_ee28/preview_
2	https://archive.nptel.ac.in/courses/108/104/108104100/

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### Second Year (Semester-IV) B.Tech. Electronics & Communication Engineering

**EC2402: Electromagnetic Theory Teaching Scheme Examination Scheme** Lectures 3 Hrs/week **CT-1** 15 Marks **CT-2 Tutorial** 0 Hrs/week 15 Marks **Total Credit** 3 10 Marks TA ESE 60 Marks Total 100 Marks Duration of ESE: 03 Hrs 00 Min. **Course Outcomes (CO)** Students will be able to **Describe** the orthogonal coordinate system for mathematical analysis of the gradient, curl, divergence of a 1 quantity and application of Gauss's Law, Divergence theorem in electromagnetic field. Explain the Coulomb's law, Gauss's law and its application in Electric Static Field Intensity for point line, 2 surface, and volume charge distributions. Interpret the Divergence Theorem, Conductor Properties and Boundaries conditions. Poisson's Equations, 3 Laplace Equations for the electric field Intensity Analyze Biot –Savart law, Ampere's Circuital law, Stoke's Theorem and Boundary wall conditions for 4 Magnetic field Intensity. Apply the Maxwell's equations for Static and Time varying fields and the concepts of Faraday's law's of 5 electromagnetic induced **Course Contents** Orthogonal coordinate systems: Cartesian, cylindrical, spherical and transformations, Gradient of a Scalar Field. Divergence of a Vector Field, Curl of a Vector Field, Laplacian Unit I Operator, Irrotational and solenoidal field. Coulomb's law, Electric field intensity for different charge distribution: point, line surface, volume, Concept of electric flux, Gauss's law and its application to field computation in Unit II symmetric structures and non-symmetric structures Divergence Theorem, Definition of Potential Field of System of Charge, Potential Gradient, Energy Density in Electrostatic Field. Current And Current Density, Conductor Properties And Boundaries Condition, Nature Of Dielectric Materials Capacitance, Capacitance Of Unit III Parallel Plate Capacitance, Capacitance Of Two Wire Line, Poisson's And Laplace Equations Biot -Savart law and applications to infinite and finite current filament, Ampere's Circuital law and applications to line charge, coaxial transmission cables, uniform current sheet Unit IV charge, solenoid, Stroke's Theorem Magnetic flux and magnetic flux density, Scalar and vector magnetic potential, Nature of magnetic materials, boundary conditions at interface of two magnetic fields, Potential energy. Time varying fields and Maxwell's equations: Faradays law, Displacement current, Unit V Maxwell's equation in point form. Maxwell's equations in integral form. **Text Books T**.1 Engineering Electromagnetics Seventh Edition William H. Hayt Tata McGraw - Hill Field and Wave Electromagnetics Second Edition 21 Jan 2010 David K. Cheng Addison T.2

**Reference Books** 

Wesley

R.1	Electromagnetism Theory and application 2ndEdition2009 Ashutosh Pramanik Prentice Hall.			
R.2	Elements of Electromagnetics M. N. O. Sadku Oxford Press.			
Useful Links				
1	https://archive.nptel.ac.in/courses/108/104/108104087/			
2	https://archive.nptel.ac.in/courses/115/104/115104088/			

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		Wardha Road, Nagpur-441108					
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Second	Year (Semester	-IV) B. Tech. Electro	nics & Communica	tion Engineering			
		BEC2403: Analog Ci	ircuit Design				
<b>Teaching Set</b>	cheme		Examination	n Scheme			
Lectures	3 Hrs/week		<b>CT-1</b>	15 Marks			
Tutorial	0 Hrs/week		<b>CT-2</b>	15 Marks			
Total Credi	it 3		ТА	10 Marks			
			ESE	60 Marks			
			Total	100 Marks			
			Duration of H	ESE: 03 Hrs 00Min.			
<b>Course Out</b>	tcomes (CO)						
Students wil	ll be able to						
Determine the	e basic principle of o	perational amplifier, para	meters, and its configur	ations			
Examine the r	need and use of linear	op-amp circuits and their ap	pplications.				
Examine non-	linear applications of	op-amp circuits and their ap	pplication				
Analyze the w	orking and componer	and filters					
Analyze the u	esigning of oscillators	Course Cont	ents				
	Op-Amp Funda	mentals: Block diagram	of operational amplifie	r, Differential amplifiers			
T 4T	using transistors	& its configurations, Op	-Amp parameters, virtu	al ground concept, Ideal			
Uniti	OP-Amp, Equi	valent circuit, Voltage	Transfer curve, Inve	rting & non inverting			
	configurations.						
	Linear Op Amp	Circuits:Voltage follow	ver, Summing amplifie	r, scaling and averaging			
UnitII	amplifier, Subt	ractor, Instrumentation	amplifier and appli	cations, Integrator and			
	differentiators,	current to voltage conver	rters, voltage to curren	t converters, Clippers &			
	Clampers.Peak	letector, Log and antilog	amplifiers and analog r	nultipliers.			
	Nonlinear Op	Amp Circuits: Compa	trators, Schmitt trigg	er, Precision Rectifier.			
	Timer and its	Bistable, Monostable, As	table using Op-Amp, S loops $D/A$ (P/P) &	$\Delta /D$ approximation aircuits			
Unit III	(Successive Apr	reprised to the province of th	sign of $\Delta DC$ using $0.80/$	A/D conversion circuits			
	Unregulated D.	C. power supply system	n with rectifiers and	filters, Design of series			
	rogulators (I M	317 337) protection cir	age regulators (IC 782	exign of SMPS (Buck &			
UnitIV	Boost)	517, 557), protection ci	cuits for regulators, D	sign of siving (buck a			
	Doost						
UnitV	OPAMP based	Wein Bridge and Phase S	hift oscillators, Transist	orized Hartley & Colpitts			
Chitv	oscillator, Crys	tal oscillators, Evaluatio	on of figure of merit	for all above oscillator			
	circuits. Design	of Butterworth Active Fi	lters LPF, HPF, BPF, B	RF etc,			
<b>Text Books</b>							
	1 Ramakant Ga	kwad, OPAMPS and Lin	ear Integrated Circuits.	PHI/Pearson Education			
	2 Franco: Desig	ning with On-Amps (Me	Graw Hill)				
		mig with Op-ramps (MC	Graw 11111 <i>]</i> .				
	3 K.R. Botkar, I	ntegrated Circuits, Khani	na Publishers, Delhi				
<b>D</b> 6 –							
<b>Reference H</b>	Books						

	1	Linear Integrated Circuits Mannal I, II, and III: National Semiconductor
	2	Regulated Power supply Handbook. Texas Instruments.
	3	Operational Amplifier Design and Applications Tobey, Graham, Huelsman McGraw Hill.
Useful Links		
	1	https://nptel.ac.in/courses/117/105/117105147/
	2	https://nptel.ac.in/courses/117/107/117107094/
	3	http://nptel.ac.in/courses/117103064

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		An Auton	NAAC Accredited (A+C	rade)	aur			
Second	Year	ar (Semester-IV) B. Tech. Electronics & Communication Engineering						
	1 041	BEC240	4: Microprocessor & M	icro-controlle	r	·····8		
Teaching Se	cheme			Examinatio	n Scheme			
Lectures		3Hrs/week		CT-1 15 Marks				
Tutorial		0Hrs/week		CT-2	15 Mark	KS		
Total Credi	t	3		ТА	10 Mark	KS		
				ESE	60 Marl	KS		
				Total	100 Ma	rks		
				Duration of	ESE:03Hrs001	Min.		
<b>Course Out</b>	come	s (CO)						
Students wil	l be al	ole to						
1.Explain t	he stru	cture, organiza	ation, and instruction set of 80	086 microprocesso	or.			
2. <b>Impleme</b>	nt inte	rfacing of 808	6 microprocessor with input o	output devices by i	using program			
3 <b>Analyze</b> t	he org	anizational str	ucture & instruction set of mi	crocontroller 805	1.			
			se for controlling displays on		51 miono o mtm	-11		
4.Appiy pro	gram the wo	ning knowledg	r of advance peripheral interf	a motors using 80.	Arduino	oner.		
J.Evaluate		Jiking benavio	Course Contents		/ Mullio.			
	80	86 microproce	essor. Pin diagram. Architectu	re features and or	perating mode	s. Flag		
Unit I	Re	egister, memor	y organization & interfacing,	Addressing mode	s, complete in	struction		
	set	t, Interrupt stru	icture.	C	· •			
	I/C	D interfacing, I	nterfacing of peripherals like	8255 PPI, multipl	lexed 7-seg dis	splay &		
Unit II	ma	atrix keyboard	interface using 8255. Program	nmable Keyboard	/Display contr	oller		
	82 &	block diagram	interfacing with 8086 & pro	gramming.	aals. USART a	8251, Pins		
	Co	omparison of n	nicroprocessor & micro-contr	oller, Introduction	to 8051 micro	C		
	co	ntroller; Pin di	agram, architecture, features	& operation, Ports	s, memory org	anization,		
Unit III	SF	R's, Flags, Co	ounters/Timers, Serial ports. I	nterfacing of exter	rnal RAM & R	COM with		
	80 &	51. 8051, Inter branching inst	rrupt structure, Instruction set	of 8051; data trar	ister, logical, a	arithmetic		
	In	terfacing of Sv	vitches, keyboard, LED & LC	D display ADC &	& DAC interfa	ce		
Unit IV	ste	epper motor in	terface.	2 uspinj, i 2 c c		,		
	PI	C Micro-contr	ollers – overview: Features, F	PIC 16c6x/7x arch	itecture, Introd	duction to		
Unit V	Ar	duino boards,	basic types, history & IDE, C	Compatible shields	with their libr	aries.		
<b>Text Books</b>								
	1 M.A. Mazidi & J.G. Mazidi, the 8051 Micro-controller and Embedded system, 3rd Indian							
	2 Microprocessor 8086/8088 Family Programme Interfacing: Liu & Gibson.							
	3 <b>P</b> 1	rogramming l	PIC Micro-controllers with	XC8 by Authors:	: Subero, Arn	nstrong.		
<b>Reference E</b>	Books							
	1 M	icro-controllers	– Peatman, Mc Graw Hill.					
	2 M	icroprocessors of	& Microcomputers based system	n design by Md. Raf	fiquzzaman.			
	3 In	Introduction to Microprocessors for Engineers and Scientists, P. K. Ghosh, P. R. Sridhar, PHI						

	Publication.
Useful Links	
1	https://nptel.ac.in/courses/108/105/108105159/
2	https://nptel.ac.in/courses/108/104/108104139/
3	https://nptel.ac.in/courses/117/106/117106108/

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Coord	Veer	Vear (Semester-IV) R Tech Flactronics & Communication Engineering						
Second Year (Semester-1v) B. Iecn. Electronics & Communication Engineering								
		BSH230	1: Human Values for	r Professi	onal Ethics			
<b>Teaching Se</b>	cheme			E	xamination Sc	heme		
Lectures		3 Hrs/week		C	T-1	15 Mai	`ks	
Tutorial		0 Hrs/week		C	T-2	15 Mai	`ks	
Total Credi	t	3		T	A	10 Mai	`ks	
				Ε	SE	60 Mai	`ks	
				Т	otal	100 Ma	arks	
				D	uration of ESE:	: 03 Hrs (	00 Min.	
Course Out	comes	(CO)						
Students wil	l be ab	le to						
Describe Va	alue Ec	lucation and it	ts role for Self-exploration	on.				
<b>Examine</b> th	e Harr	nony in the H	uman Being and Society	al Order				
Examine th	of theo	ries of Basic E	thical principles					
Predict Glo	bal Iss	ues in Profess	sional Ethics and Sustaina	able Develo	oment			
			Course Cont	ents				
	Int	troduction to	Value Education					
	Va	alue Educatio	on, Definition, Concept a	and Need fo	r Value Educa	tion, The	e Content	
Unit I	an	d Process of	Value Education, Basic	Guidelines	for Value Edu	cation, S	elf-	
	ex	ploration as a	a means of Value Educat	tion.				
	Ha	rmony in th	e Human Being, Famil	y, Society a	and Nature			
Unit II	Hı	uman Being is	s more than just the Bod	ly, Understa	anding Myself	as Co-ez	kistence of	
	the	e Self and the	Body, Understanding the	he activities	s in the Self and	d the act	ivities in	
	the Th	e Body, Fami	lly as a basic unit of Hur Respect and today's Cri	nan Interac	tion and Value	s in Kela Povoron	tionships,	
	So	Social Ethics						
	Tł	e Basics for I	Ethical Human Conduct	. Defects in	Ethical Huma	n Condu	ct. Holistic	
	Al	ternative and	Universal Order, Unive	ersal Humai	n Order and Et	hical Co	nduct.	
Unit III		• 753 •						
	Ba	sic Theories	ringinlas Maral Davala	nmonto Do	ontology II41	torionics	n Virtuo	
	Dù the	ory Rights	Theory Casuist Theory	Moral Abs	olution Moral	Rationa	li, viitue lism	
Unit IV	M	oral Pluralisn	n. Ethical Egoism. Femi	nist Consec	uentialism. M	oral Issu	es. Moral	
	Di	lemmas, Moi	ral Autonomy.		I ,		,	
		ahal Issuas :	n Professional Ethica					
Unit V	Gl Int	roduction_ C	urrent Scenario Techn	ology Glob	alization of N	INC s I	nternational	
	Tra	ade. World	Summits. Issues. Bus	siness Eth	ics and Corr	orate C	lovernance.	
	Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection.						Deflection,	
	Po	llution, Ethic	s in Manufacturing and	l Marketing	g, Media Ethic	s; War	Ethics; Bio	
	Eth	nics, Intellect	ual Property Rights.					
Text Books								
	1	A.N Tripathy	, New Age International	Publishers,	2003.			
<sup>2</sup> Baipai, B. L. New Royal Book Co. Lucknow, Reprinted, 2004.								

3	Bertrand Russell Human Society in Ethics & Politics.				
4	<sup>4</sup> Professional Ethics: R. Subramanian, Oxford University Press, 2015.				
Reference Books					
1	Corliss Lamont, Philosophy of Humanism.				
2 Gaur. R.R, Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, E					
	Books, 2009.				
3	Gaur. R.R, Sangal. R, Bagaria. G.P, Teachers Manual Excel Books, 2009.				
4	I.C. Sharma. Ethical Philosophy of India Nagin& co Julundhar.				
5	Mortimer. J. Adler, – Whatman has made of man.				
6	Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael				
	J Rabins, Cengage Learning, 2015.				

Non Third BOS Chairman

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Wardha Road, Nagpur-441 108 MAACAccredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur           Second Year (Semester-IV) B. Tech. Electronics & Communication Engineering BEC2406: Signals and Systems Lab           Teaching Scheme         Examination Scheme           Practical         2 Hrs/week         CA         25 Marks           Total Credit         1         Examination Scheme         Examination Scheme           Practical         2 Hrs/week         Examination Scheme         Examination Scheme           Course Outcomes (CO)         Students will be able to         Duration of ESE: 02 Hrs 00 Min.           2 Explain LTI system bused on impulse response Using Convolution theorem         3           3 Malyze spectral characteristics of continuous-time Periodic and Aperiodic signals using Fourier Series and Transform.         CO           4 Examine sampling and interpolation to sample and reconstruct signals.         CO         1           2 Explore the commutation of even and odd symmetries in a signal with algebraic cori operations.         CO         1           3 Explore the effect of transformation of signal parameters (amplitude-scaling, and time cori spring signal spring frequency.         CO           4 Explore the various properties of the impulse signals.         CO2         5         1         CO2           4 Explore the effect of transformation of signal parameters (amplitude-scaling, and time operations difference Boorie			Tulsiramji Gaikwad-Patil College of Engineering and Technology						
NAAC Accredited (A+ Grade) An Autonomous Institute affiliated to RTMNU Nagpur         Second Year (Semester-IV) B.Tech. Electronics & Communication Engineering BEC2406: Signals and Systems Lab         Teaching Scheme       Examination Scheme         Practical       2 Hrs/week       Examination Scheme         Total Credit       1       ESE       25 Marks         Total       2 Hrs/week       ESE       2 S Marks         Outation of ESE: 02 Hrs 00 Min.       Duration of ESE: 02 Hrs 00 Min.         Course Outcomes (CO)       Students will be able to       Duration of ESE: 02 Hrs 00 Min.         I       Determine the responses and Classification of Signals and systems.       Course outcomes         2       Explain LTI system based on inpulse response Using Convolution theorem       3       Analyze spectral characteristics of continuous-time Periodic and Aperiodic signals using Fourier Series and Transform.       CO         4       Examine sampling and interpolation to sample and reconstruct signals.       CO       CO         3       Ibstrate the Laplace and Z transform to evaluate the continuous-time and discrete-time signals and systems.       CO         3       Demonstrate generation of some simple signals such as the complex exponential signal and real sinuxoids.       CO         4       Examine sampling frequency.       CO2       Explore the effect of transformation of signal parameters (amplitude-scalin	7	Wardha Road, Nagpur-441 108							
An Autonomous Institute affiliated to RTMNU Magpur           Second Year (Semester-IV) B, Tech. Electronics & Communication Engineering           BEC2406: Signals and Systems Lab           Teaching Scheme         Examination Scheme           Practical         2 Hrs/week           Total Credit         1           Course Outcomes (CO)         50 Marks           Students will be able to         1           1         Determine the responses and Classification of Signals and systems.           2         Explain LTI system based on impulse response Using Convolution theorem           3         Analyze spectral characteristics of continuous-time Periodic and Aperiodic signals using Fourier Series and Transform.           4         Examine sampling and interpolation to sample and reconstruct signals.           5         Illustrate the Laplace and Z transform to evaluate the continuous-time and discrete-time signals and systems.           2         Explore the commutation of some simple signals such as the complex exponential signal and real sinuxoids.         CO1           2         Explore the effect of transformation of signal parameters (amplitude-scaling, and time CO2 spiniting).         CO2           4         Explore the effect of transformation of signal.         CO2           4         Explore the effect of transformation of signal parameters (amplitude-scaling, and time CO2 sparations supplie greeney.         CO2	1	NAAC Accredited (A+ Grade)							
Second Year (Semester-IV) B.Tech. Electronics & Communication Engineering           BEC2406: Signals and Systems Lab           Fractical         2 Hrs/week         Examination Scheme           Practical         2 Hrs/week         Examination Scheme           Course Outcomes (CO)         ESE         25 Marks           Students will be able to         Duration of ESE; 02 Hrs 00 Min.           2         Explain I.TI system based on impulse response Using Convolution theorem         3           3         Analyze spectral characteristics of continuous-time Periodic and Aperiodic signals using Fourier Series and Transform.         CO           4         Examine sampling and interpolation to sample and reconstruct signals.         COI         1           9         Demonstrate generation of some simple signals such as the complex exponential signal and real sinusoids.         COI         1           2         Explore the effect of transformation of signal parameters (amplitude-scaling, and time operations         CO2           3         Explore the various properties of the impulse signals.         CO2         1         CO2           4         Explore the effect of transform of a signal.         CO2         1         CO1           4         Explore the effect of transform of a signal.         CO2         1         CO2         2         Explore the ef		An Autonomous Institute affiliated to RTMNU Nagpur							
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etc.       Compute discrete Fourier transform of a signal.       CO3         7       Demonstrate Perceval's theorem associated with Fourier series analysis for a periodic square wave sampled using appropriate sampling frequency.       CO4         8       Verify Multiplication property associated with Fourier series analysis for a periodic triangular wave sampled using appropriate sampling frequency       CO4         9       Verify shifting property associated with Fourier series analysis for a periodic square wave sampled using appropriate sampling frequency       CO4         10       Compute Z transform of a sequence.       CO5         Text Books       CO5         2       Lathi, B. P., and R. A. Green. Linear Systems and Signals. 2018.         3       Signals & Systems Analysis Using Transformation - 1st edition 2003. Robert McGraw-Hill         Reference Books       1         1       Digital signal processing- A practical approach 2 <sup>nd</sup> Edition, 2002.E. C. Ifeachar, B. W. Jarvis Pearson		5	Id	Identify given system as linear or non-linear, causal or non-causal, stable or unstable					le CO3
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square wave sampled using appropriate sampling frequency.       CO4         8       Verify Multiplication property associated with Fourier series analysis for a periodic triangular wave sampled using appropriate sampling frequency       CO4         9       Verify shifting property associated with Fourier series analysis for a periodic square wave sampled using appropriate sampling frequency       CO4         10       Compute Z transform of a sequence.       CO5         Text Books       CO5         1       A.V. Oppenheim, A.S. Wilsky and H. Nawab S, "Signals & Systems", Prentice-Hall, 2005         2       Lathi, B. P., and R. A. Green. Linear Systems and Signals. 2018.         3       Signals & Systems Analysis Using Transformation - 1st edition 2003. Robert McGraw-Hill         Reference Books       1         1       Digital signal processing- A practical approach 2 <sup>nd</sup> Edition, 2002.E. C. Ifeachar, B. W. Jarvis Pearson	7 De		<b>Demonstrate</b> Perceval's theorem associated with Fourier series analysis for a periodic				ic CO4		
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2 Digital Signal Processing - A Nagoor Kani 2nd Edition McGraw Hill									

Useful Links						
1	https://nptel.ac.in/courses/108/104/108104139/					
2	http://nptel.ac.in/courses/117107095					

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Second Year (Semester-IV) B. Tech. Electronics & Communication Engineering								
			BEC2407	: Microprocess	or & Micro-	controller Lab		
Tea	Teaching Scheme     Examination Scheme							
Pra	ctical		2 Hrs/week			CA	25 Marks	
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4	Impleme	ent of o	digital clock des	sign using 8086 and	LED blinking or	the 8051 microcon	trollers.	
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	1	F	zocuto on ALD	to perform a 16 h	it addition in D	MS		
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	5	W	/ <b>rite</b> a Program	n to separate even and odd numbers from array in 8086.			CO3	
	6	P	repare a prog	ram to find largest	number from a	rray in 8086 micro	processors.	<b>CO3</b>
	7	P	repare a Prog	am for digital clock design using 8086.			<b>CO4</b>	
	8	P	repare an ALl	of LED blinking in 8051.			CO4	
	9	W	/ <b>rite</b> a program	n of 8051 with 7 Segment LED display.			CO5	
	10	C	<b>reate</b> a 8051 p	program to delay a	Stepper Motor.			CO5
Tex	<b>xt Books</b>	<b>b</b> <i>c</i> ·				1 1 1 1 1	0.17.2	
	1	M.A. Pears	Mazıdi & J.G. ] on Education	Mazidi, the 8051 Mi	cro-controller an	d Embedded systen	n, 3rd Indian	reprint,
	2	Micro	processor 8086	/8088 Family Progr	amme Interfacing	y. Liu & Gibson		
	3	Progr	amming PIC N	Micro-controllers	with XC8 by Ai	ithors: Subero. Ar	mstrong.	
Reference Books								
1 Micro-controllers – Peatman. Mc Graw Hill.								
2 Microprocessors & Microcomputers based system design by Md. Rafiguzzaman								
Useful Links								
1 https://nptel.ac.in/courses/108/105/108105159/								
	2	https	//nptel.ac in/co	urses/108/104/1081	04139/			
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		BE	CC2408: Analog	<b>Circuit Des</b>	ign Lab			
Teaching Scheme     Examination Scheme								
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Total Cree	dit	1			ESE	25 Mark	S	
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Course Ou	itcomes	s (CO)						
Students w	ull be ab	ole to						
1 Detern	nine the	basic principl	le of operational an	nplifier, parame	eters, and its config	gurations.		
2 Exami	ne the n	eed and use of	t linear op-amp circ	cuits and their a	applications.			
3 Analyz	ze non-li	inear application	ons of op-amp circ	cuits and their a	ipplications			
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Sr. No. 1	Analyza	Frequency	List of	<u>experiment</u>	ing On Amn Usin	g IC 7/1		
1	Implem	ent Adder &	Subtractor Circuit	$\frac{g \& Noll liven}{using On Amp$	nig Op Anp Usin	g IC 741	$\frac{CO1}{CO2}$	
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3	Amp					using Op	02	
4	Observe	e waveform of	clipper & clamper	circuit using O	p Amp		CO2	
5	Observe	e waveform of	Schmitt trigger cir	cuit as square v	wave generator.		CO3	
6	Observe	e waveform of	function generator	using Op Amp	o (Sine, Square, Tr	iangular)	CO3	
7	Design A	Astable Multiv	vibrator using Op a	mp IC 741.			CO3	
8	8 Design Astable Multivibrator using IC 555 timer						CO3	
9	Impleme	ent series & sh	hunt voltage regula	tors.			CO4	
10	Analyze	e active filters	circuit LPF, HPF,	BPF, BRF			CO5	
Text Book	1 D	lizant Call	d ODAMDC 1 T	noon Treta 4 1	Cinquita DIII/D	moor D-1	ation	
			u, OPAINIPS and Li	mear integrated	Circuits, PHI/Pea	uson Educ	ation.	
	2 Franc	co: Designing	with Op-Amps (M	cGraw Hill).				
Defe	3 K.R.	Botkar, Integr	rated Circuits, Khai	nna Publishers,	Delhi			
Keterence	BOOKS							
	1 Linear Integrated Circuits Mannal I, II, and III: National Semiconductor							
	2 Regulated Power supply Handbook. Texas Instruments.							
3 Operational Amplifier Design and Applications Tobey, Graham, Huelsman McGraw Hill.								
Useful Links								
	1 https:	://nptel.ac.in/c	courses/117/105/11	7105147/				
	2 https:	://nptel.ac.in/c	courses/117/107/11	7107094/				
	3 <u>http:/</u>	//nptel.ac.in/co	ourses/117103064					
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