Gondwana University,

Gadchiroli

Board of Studies in

Electronics and Communication Engineering/

Electronics and Telecommunication Engineering

Choice Based Credit System

III/IV/V/VI Semesters Syllabus

,

Appendix A

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Third Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
3BEET01	Applied Mathematics-III	4	0	0	4	3	80	10	10	100	40	--	--	--	--
3BEET02	Digital Electronics	3	1	0	3	3	80	10	10	100	40	--	--	--	--
3BEET03	Electronic Devices & Circuits	3	1	0	3	3	80	10	10	100	40	--	--	--	--
3BEET04	Electronic Measurements & Instrumentation	3	1	0	3	3	80	10	10	100	40	--	--	--	--
3BEET05	Network Theory	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratories															
3BEET06	Digital Electronics	0	0	2	2	--	--	--	--	--	--	25	25	50	25
3BEET07	Electronic Devices & Circuits	0	0	2	2	--	--	--	--	--	--	25	25	50	25
3BEET08	Electronic Measurements & Instrumentation	0	0	2	2	--	--	--	--	--	--	25	25	50	25
Total		**16**	**3**	**6**						**500**				**150**	
Semester Total		**25**			**22**										**650**

Appendix A

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Fourth Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
4BEET01	Applied Mathematics-IV	4	0	0	4	3	80	10	10	100	40	--	--	--	--
4BEET02	Analog Circuits	3	1	0	3	3	80	10	10	100	40	--	--	--	--
4BEET03	Electromagnetic Fields	3	1	0	3	3	80	10	10	100	40	--	--	--	--
4BEET04	Electronic Engineering Materials and Components	3	0	0	3	3	80	10	10	100	40	--	--	--	--
4BEET05	Microprocessor and interfacing	3	1	0	3	3	80	10	10	100	40	--	--	--	--
Laboratories															
4BEET06	Analog circuits	0	0	2	2	--	--	--	--	--	--	25	25	50	25
4BEET07	Microprocessor and interfacing	0	0	2	2	--	--	--	--	--	--	25	25	50	25
4BEET08	Object oriented language Lab	0	0	2	2	--	--	--	--	--	--	25	25	50	25
4BEET09	**Personal proficiency**	0	0	2	2							50		50	25
Total		**16**	**3**	**8**						**500**				**200**	
Semester Total		**27**			**24**										**700**

Appendix A

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Fifth Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
5BEET01	Linear Electronic Circuits	3	1	0	3	3	80	10	10	100	40	--	--	--	--
5BEET02	Microcontroller and its applications	4	1	0	3	3	80	10	10	100	40	--	--	--	--
5BEET03	Power Electronics	3	0	0	3	3	80	10	10	100	40	--	--	--	--
5BEET04	Signals & Systems	3	1	0	3	3	80	10	10	100	40	--	--	--	--
5BEET05	**Program Elective - I**	3	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															
5BEET06	Linear Electronic Circuits	0	0	2	2	--	--	--	--	--	--	25	25	50	25
5BEET07	Microcontroller and its applications	0	0	2	2	--	--	--	--	--	--	25	25	50	25
5BEET08	Signals and Systems	0	0	2	2							25	25	50	25
5BEET09	**Minor Project &Seminar**	0	0	2	2							50		50	25
Total		**16**	**3**	**8**						**500**				**200**	
Semester Total		**27**			**24**										**700**

Program Elective - I 1. Information Theory and Coding, 2. Speech and Audio Processing, 3. Introduction to MEMS.

 # Industrial Training /Internship/Case Studies:- It is to be completed during the summer vacation after completion of fourth semester and/or winter vacation after the completion of Fifth semester and its planning and allocation should be done during the fourth/ fifth semester and its marks will be awarded in the sixth semester for subject code 6BEET09on submission of the certified relevant report at the end of sixth semester.

Appendix A

Four Year Degree Cour se in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Sixth Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
6BEET01	Control System	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET02	Digital Signal Processing	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET03	Fields & Radiating Systems	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET04	Principals of Communication	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET05	**Program Elective - II**	4	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															
6BEET06	Control System	0	0	2	2	--	--	--	--	--	--	25	25	50	25
6BEET07	Digital Signal Processing	0	0	2	2	--	--	--	--	--	--	25	25	50	25
6BEET08	Principals of Communication	0	0	2	2	--	--	--	--	--	--	25	25	50	25
6BEET09	**# Industrial Training /Internship/Case Studies**	0	0	2	2							25	25	50	25
Total		**16**	**4**	**8**						**500**				**200**	
Semester Total		**28**			**24**										**700**

Program Elective - II 1. CMOS Design, 2. Scientific computing, 3. Nano electronics

Program Elective - I 1. Information Theory and Coding, 2. Speech and Audio Processing, 3. Introduction to MEMS.
 # Industrial Training /Internship/Case Studies:- It is to be completed during the summer vacation after completion of fourth semester and/or winter vacation after the completion of Fifth semester and its planning and allocation should be done during the fourth/ fifth semester and its marks will be awarded in the sixth semester for subject code 6BEET09on submission of the certified relevant report at the end of sixth semester.

Appendix A

GONDWANA UNIVERSITY, GADCHIROLI

FACULTY OF ENGINEERING AND TECHNOLOGY

CONSLIDATED STATEMENT OF VARIOUS PARAMETERS IN TEACHING & EXAMINATION SCHEME OF B.E. (ELECTRONICS AND COMMUNICATION ENGINEERING / ELECTRONICS AND TELECOMMUNICATION ENGINEERING)

SR.NO.	SEMESTER	NO. OF THEORY SUBJECTS	NO OF LABS/PRACT	TEACHING HOURS(TH) (L+T)	TEACHING HOURS (PRACT)	TOTAL CREDIT	MAX. THEORY MARKS	MAX.PRACT MARKS	MAX. MARKS TOTAL
1	I								
2	II								
3	III	5	3	19	6	22	500	150	650
4	IV	5	4	19	8	24	500	200	700
5	V	5	4	19	8	24	500	200	700
6	VI	5	4	20	8	24	500	200	700
7	VII	5	3	20	8	24	500	150	650
8	VIII	5	2	20	8	24	500	200	700
		30	**20**	**117**	**46**	**142**	**3000**	**1100**	**4100**

Subject wise Board of Studies Affiliation

Board of Studies	**Subject Codes**
APPLIED SCIENCES & HUMANITIES	3BEET01, 4BEET01, 4BEET09
ELECTRICAL ENGINEERING	3BEET05, 5BEET03, 6BEET01
COMPUTER SCIENCE/IT ENGG	4BEET08, 8BEET05
ETC ENGINEERING	Rest all ,except above enlisted
EN/ETC/ECE COMMOMN	BEET302/BEEN302, BEET305/BEEN305,BEET 403/BEEN403,BEET405/BEEN404 BEET501/BEEN501,BEET502/BEEN502, BEET601/BEEN601,BEET602/BEEN602,BEET701/BEET701,BEET801/BEEN801

V SEMESTER B.E.

ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **5BEET01**

Title of the Course : **LINEAR ELECTRONIC CIRCUITS**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I.	Basic Operational Amplifier, Differential Amplifier Stages, Current Source Biasing, Level Shifting Techniques, Common Mode and Differential Mode Gains, Frequency Response and Compensation.	10
II.	Characteristics of Ideal And Non Ideal Op Amp, Error Measurement of Various Parameters, Linear Application Like Inverting, Non Inverting. Integrator, Differentiator, Differential Amp, Bridge Amplifier, Voltage to Current Converter, Regulators.	12
III.	Non-Linear Application Like Limiters, Precision Rectifier, Log Amplifier, Antilog Amplifier, Multiplier, Divider, Astable, Monostable, Comparator, Schmitt Trigger, Square to triangular Wave Generator.	08
IV.	Design of Active Filter. 1st And 2nd Order Butterworth Filter, Sinusoidal Oscillators D/A and A/D Conversion Circuits, Sample Hold Circuits.	08
V.	Application of ICs Like LM741, LM 555 Timer ICs, Phase Locked Loop, LM 566(VCO), LM 339 (Comparator), LM 723 (Voltage Regulator), Regulator IC Series 78xx, 79xx.	12

Reference Books :

1. R. A. Gaikwad, "Op Amps and Linear Integrated Circuits", PHI Publication, 4th Edition
2. D. Roy Choudhary, Shail Jain, "Linear Integrated Circuits", New Age International
3. U. A. Bakshi, A. P. Godse, "Linear Integrated Circuits & Application", Technical Publication Pune
4. K. R. Botkar, "Integrated Circuits", Khanna Publication 9th Edition
5. Coughlin, Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI Publication 4th Edition

Course Outcome

At the end of the course Students will be able to –

CO1 Analyze a given differential amplifier or Design a differential amplifier to meet the given specifications with constant current bias circuit.

CO2 Define the general properties of an operational amplifier (op-amp).

CO3 Demonstrate different applications of operational amplifiers and analog integrated circuits.

CO4 Analyze & Design the different filter circuits using operational amplifiers.

CO5 Distinguish A/D and D/A convertors.

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 5BEET02

Title of the Course : MICROCONTROLLER AND ITS APPLICATIONS

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
4	1	0	4	3	3	10	10	80	100

Units	Contents	Hours
1	Evolution of microcontrollers, The 8051 Microcontroller**:** Block diagram, programming model, pin diagram, flag register and PSW, memory organization, stack and stack pointer, special function registers	10
2	I/O ports, Interrupts, counters and timers, Serial data Input/output, external memory	08
3	Addressing modes, Instruction set: Data transfer, logical, arithmetic, branching, Assembly language programming	10
4	Interfacing: keyboard, LED and LCD, ADC/DAC, stepper motor interfacing,	09
5	AT89C51microcontroller: Pin diagram, Architecture, features of flash memory AT89C2051microcontroller: the baby 8051, pin diagram, architecture, flash memory	8
	Total	**45**

TEXT BOOK:

1. 8051 Microcontroller and Embedded Systems using Assembly and C by Keneth J. Ayala, Dhananjay V. Gadre Cengage Learning
2. The 8051 Microcontroller Hardware, Software and applications by V. Udayshankara, M. S. Mallukarjunswamy, Mcgraw-Hill
3. 8051 Microcontroller and Embedded Systems using Assembly and C by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D.MacKinlay, Pearson Education, Second Edition.

REFERENCE BOOKS:

1. Microprocessor and Microcontroller by R. Theagarajan, Sci Tech Publication, Chennai.
2. Architecture, Programming, Interfacing and System Design by Raj Kamal, Pearson Education.

Course Outcome:

At the end of the course Students will be able to –

CO1 To understand the architecture of 8051 microcontroller

CO2 To write Assembly and high level languages for microcontroller 8051.

CO3 To demonstrate knowledge of interfacing peripheral device/ memory with microcontroller 8051.

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 5BEET03

Title of the Course : Power Electronics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**0**	**0**	**3**	**4**	**3**	**10**	**10**	**80**	**100**

UNIT	CONTENTS	HOURS
I	**Basics in Power Electronics Engineering** Development of Power Controllers, Working Principle & Characteristics of different Power Controllers, Thyristor Family, Two Transistor model of SCR, Gate Characteristic, Turn On , Turn Off Mechanisms & other ratings of SCRs , Relaxation Oscillators using UJT, Basic Firing Circuits for SCR, Application of SCR in obtaining Logic Gates, Flip Flop and Circuit Breaker, AC Power control using TRIAC- DIAC, Basic Firing Circuits for SCR Power Transistor, Power MOSFET & IGBT (Basic properties, characteristics, comparison & applications)	12
II	**Phase Controlled Rectification** Principle of Phase Control, Line Commutation, Single phase half wave, Full wave mid –point, Fully controlled with & without freewheeling diode with different types of Loads, Effect of Source inductance, Half Controlled Bridge configurations, Development of expressions for mean current & voltage for different loads, Dual Converter Three Phase fully controlled & half controlled bridge circuits , Development of expressions for mean voltage	10
III	**Inverters** Principle of Inversion, Various Techniques of Forced Commutation & their designs, Single phase & Three phase series Inverter, Single Phase Parallel Inverter, Single phase bridge Inverter (All with commutation Circuits), Design of Filter Three phase fully controlled bridge inverters in different modes (without commutation Circuit), Design of complete firing circuit for Three phase Power Control Circuits	12
IV	**Choppers & Cycloconverter** Principle of Working ,Types of Choppers, Oscillating Chopper, Jones & Morgan's Chopper, Multi Phase Chopper, Step Up Chopper, AC Chopper, Need & Principle of Working of Cycloconverter using single phase bridge circuits	08
V	**Multiple Connection & Protection** Need & methods of multiple connections of SCRs, Design of Equalizing Circuits, Firing Circuits during multiple connection, Gate protection, Over current & over voltage protections of SCR, Design of Snubber Circuit, Converter Faults	08
	Total	**50**

Text Books

(1) M.H. Rashid, "Power Electronics Circuits, Devives & Applications", Pearson Education
(2) C.W. Lander, "Power Electronics", McGraw Hill
(3) M. Ramamoorthy, " Thyristors & their Applications"
(4) GK Dubey, Doradla, Singh, Joshi " Thyristorstorized Power Controllers", New Age International
(5) Singh, Khanchandani, " Power Electronics", Tata McGraw Hill
(6) SCR Manaual by General Electric

Reference Books

(1) Philip T. Krein, “Elements of Power Electronics”, Oxford University Press
(2) Vedam Subrahmanyam, “Power Electronics”, New Age International
(3) MS Jamil Asghar, “Power Electronics”, Prentice Hall of India
(4) PC Sen, ‘Modern Power Electronics”, S. Chand Publishers
(5) PS Bhimra, “Power Electronics”, Khanna Publishers

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 5BEET04

Title of the Course : **SIGNALS AND SYSTEMS**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**4**	**3**	**10**	**10**	**80**	**100**

COURSE OBJECTIVES:

The aim of the course is for:

1. Understanding the fundamental characteristics of signals and systems.
2. Understanding signals and systems in terms of both the time and transform domains, taking advantage of the complementary insights and tools that these different perspectives provide.
3. Development of the mathematical skills to solve problems involving convolution, filtering and modulation.

Unit	Contents	Hours
I	**INTRODUCTION TO SIGNALS AND SYSTEMS**	
	Introduction, Continuous Time and Discrete Time signals, Elementary Signals: Unit Impulse, Unit Step, Ramp, Rectangular, Triangular, Signum, Sinc, Exponential and Sinusoidal, Transformation of Independent Variable: Time Shifting, Time Scaling and Time Reversal,Classification of Signals: Periodic and Aperiodic, Even and Odd, Energy and Power, Causal and Non causal. Systems: Definition, Classification: Linear and Non Linear, Time Variant and Invariant, Causal and Non-causal, Static and Dynamic, Stable and Unstable, Invertible and Non Invertible, Incrementally linear Systems.	10
II	**LINEAR TIME INVARIANT SYSTEMS**	
	Discrete-Time LTI Systems: The Convolution Sum, Continuous-Time LTI Systems: The Convolution Integral, Properties of Linear Time-Invariant Systems: Invertibility, Causality, Stability, Unit step response of an LTI System, Causal LTI Systems Described by Differential and Difference Equations.	9
III	**FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS**	
	The Response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-TimePeriodic Signals, Convergence of the Fourier Series, Properties of Continuous-Time Fourier Series, Fourier Series Representation of Discrete-TimePeriodic Signal, Properties of Discrete-Time Fourier Series, Fourier Series and LTI Systems.	9

IV	**FOURIER TRANSFORM**	
	Representation of Aperiodic Signals: The Continuous-TimeFourier Transform, The Fourier Transform for Periodic Signals, Properties of the Continuous-Time Fourier Transform, The Discrete-TimeFourier Transform (DTFT), DTFT of Discrete Periodic Signals, Properties of the DTFT.	9
V	**THE LAPLACE TRANSFORM**	
	The Laplace Transform, The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from thePole-Zero Plot, Properties of the Laplace Transform, Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using theLaplace Transform, The Unilateral Laplace Transform.	8

TEXT BOOKS:

1. "Signals and Systems" by Alan V. Oppenheim, Alan S. Wilsky and S. Hamid Nawab, Publication: Prentice Hall of India.
2. "Signals and Systems" by P. Ramesh Babu, R. AnandaNatarajan, SciTech Publications (India).

REFERENCE BOOKS:

1. "Signals and Linear Systems" by Gabel R.A. and Robert R.A, John Wiley and Sons, New York.
2. "Systems and Signal Analysis" by C. T. Chen Publication: Oxford University Press, India.
3. "Introduction to Signals and Systems" by Michael J. Robert, Publication: Tata Mc-Graw Hill.
4. "Signals and Systems" by S. Haykin and B. V. Veen, Publications: Joh n Wiley and Sons, Inc.
5. "Signals and Systems Analysis using, Transform Methods and MATLAB " by M. J. Roberts Tata McGraw-Hill Publishing Company Limited.

Course Outcome

At the end of the course Students will be able to –

CO1 Analyse different types of signals & Systems.
CO2 Determine the response of LTI system using convolution.
CO3 Assess the spectral characteristics of periodic and aperiodic signals.
CO4 Inspect system properties based on impulse response.
CO5 Prove the properties of various transforms

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code **5BEET05**

Title of the Course : **PROGRAM ELECTIVE-I (INFORMATION THEORY A ND CODING)**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**4**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I	Basics of information theory, entropy for discrete ensembles; Shannon's noiseless coding theorem; Encoding of discrete sources	9
II	Introdution to TCM (Trellis Coded Modulation),TCM encoding,decoding,introduction to BCH Code,BCH encoding and decoding of BCH Code., Reed Solomon(RS) Code, RSA Algorithm, RSA encryption and decryption.	9
III	Markov sources; Shannon's noisy coding theorem and converse for discrete channels	9
IV	Calculation of channel capacity and bounds for discrete channels; Application to continuous channels.	9
V	Techniques of coding and decoding; Huffman codes and uniquely detectable codes; Cyclic codes, convolutional arithmetic codes	9

Text/Reference Books:

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. M. Mansurpur, Introduction to Information Theory, McGraw Hill, 1987.
3. R.B. Ash, Information Theory, Prentice Hall, 1970.
4. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall, 1983.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the concept of information and entropy
2. Understand Shannon’s theorem for coding
3. Calculation of channel capacity
4. Apply coding techniques

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **5BEET05**

Title of the Course : **PROGRAM ELECTIVE-I (SPEECH AND AUDIO PROCESSING)**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**0**	**0**	**3**	**4**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I		
	Introduction- Speech production and modeling - Human Auditory System;General structure of speech coders; Classification of speech coding techniques – parametric, waveform and hybrid ; Requirements of speech codecs –quality, coding delays, robustness. Speech Signal Processing- Pitch-period estimation, all-pole and all-zero filters, convolution;	9
II		
	Power spectral density, periodogram, autoregressive model, autocorrelation estimation. Linear Prediction of Speech- Basic concepts of linear prediction; Linear Prediction Analysis of nonstationary signals –prediction gain, examples; Levinson-Durbin algorithm; Long term and short-term linear prediction models; Moving average prediction.	9
III		
	Speech Quantization- Scalar quantization–uniform quantizer, optimum quantizer, logarithmic quantizer, adaptive quantizer, differential quantizers; Vector quantization – distortion measures, codebook design, codebook types Scalar Quantization of LPC- Spectral distortion measures,	8
IV		
	Quantization based on reflection coefficient and log area ratio, bit allocation; Line spectral frequency – LPC to LSF conversions, quantization based on LSF. Linear Prediction Coding- LPC model of speech production; Structures of LPC encoders and decoders; Voicing detection; Limitations of the LPC model.	8
V		
	Code Excited Linear Prediction-CELP speech production model; Analysis-by-synthesis; Generic CELP encoders and decoders; Excitation codebook search – state-save method, zero-input zero-state method; CELP based on adaptive codebook, Adaptive Codebook search; Low Delay CELP and algebraic CELP. Speech Coding Standards-An overview of ITU-T G.726, G.728 and G.729standards	11

Text/Reference Books:

1. “Digital Speech” by A. M. Kondoz, Second Edition (Wiley Students‟ Edition), 2004.
2. “Speech Coding Algorithms: Foundation and Evolution of Standardized Coders”, W.C. Chu, Wiley Inter science, 2003.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Mathematically model the speech signal
2. Analyze the quality and properties of speech signal.
3. Modify and enhance the speech and audio signals.

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **5BEET05**

Title of the Course : **PROGRAM ELECTIVE-I (INTRODUCTION TO MEMS)**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**0**	**0**	**3**	**4**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I		
	Introduction and Historical Background, Scaling Effects. Micro/Nano Sensors, Actuators and Systems overview: Case studies	9
II		
	Review of Basic MEMS fabrication modules: Oxidation, Deposition Techniques, Lithography (LIGA), and Etching. Micromachining: Surface Micromachining,	9
III		
	Sacrificial layer processes Stiction, Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding	9
IV		
	Mechanics of solids in MEMS/NEMS: Stresses, Strain, Hookes's law, Poisson effect, Linear Thermal Expansion, Bending; Energy methods.	9
V		
	Overview of Finite Element Method, Modeling of Coupled Electromechanical Systems.	9

Text/Reference Book:

1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India, 2012.
2. S. E.Lyshevski, Nano-and Micro-Electromechanical systems: Fundamentals of Nano-and Microengineering (Vol. 8). CRC press, (2005).
3. S. D. Senturia, Microsystem Design, Kluwer Academic Publishers, 2001.
4. M. Madou, Fundamentals of Microfabrication, CRC Press, 1997.
5. G. Kovacs, Micromachined Transducers Sourcebook, McGraw-Hill, Boston, 1998.
6. M.H. Bao, Micromechanical Transducers: Pressure sensors, accelerometers, and Gyroscopes, Elsevier, New York, 2000.

Course Outcomes:

At the end of the course the students will be able to
1. Appreciate the underlying working principles of MEMS and NEMS devices.
2. Design and model MEM devices

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 5BEET06

Title of the Course : **LINEAR ELECTRONIC CIRCUITS PRACTICAL**

Course Scheme					Evaluation Scheme(Laboratory)		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	**0**	**2**	**2**	**2**	**25**	**25**	**50**

Minimum 8 practical based on Theory syllabus

50 % of the experiments are based on ORCAD or any Equivalent simulation software.

List of suggested practical's
1. To Study elementary circuit using Op-amp(Inverting ,Non Inverting amplifiers, voltage follower, Integrator and Differentiator) 2. To study square and triangular wave generating circuits. 3. To study Op-Amp parameters-I (input impedance, output impedance, slew rate , frequency response) 4. To study Op-Amp parameters-II (Input offset voltage, Input offset current, Input bias current, CMRR) 5. To study instrumentation amplifier. 6. To study log amplifier 7. To study wein bridge oscillator 8. To study Op-Amp as low pass filter. 9. To study Op-Amp as high pass filter. 10. To study IC 555 timer.

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 5BEET07

Title of the Course : MICROCONTROLLER AND ITS APPLICATIONS PRACTICAL

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	2	2	25	25	50

Minimum 8 practical based on Theory syllabus

Suggested list of experiments: (Using Keil software):-

1. Programs illustrating Data Transfer Operations
2. Programs illustrating Arithmetic Operations
3. Programs illustrating Boolean & Logical Operations
4. Programs illustrating Conditional CALL & RETURN instructions
5. Programs illustrating different code conversions
6. Programs using Timers, Counter, Serial Ports and Interrupts
7. Keyboard interface to 8051
8. Traffic light interface to 8051
9. External ADC and Temperature control interface to 8051
10. Logic controller Interface to 8051
11. Elevator interface to 8051
12. ON/OFF alternate LEDs by sequential keys
13. Display string on LCD using
14. Create the delays with timers & interrupts
15. Read A/D value, convert it to actual & display it on LCD

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 5BEET08

Title of the Course : SIGNALS AND SYSTEMS PRACTICAL

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	2	2	25	25	50

Minimum 8 practical based on Theory syllabus

FIFTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code: **5BEET09**

Title of the Course: **MINOR PROJECT & SEMINAR**

Course Scheme					Evaluation Scheme(Laboratory)		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	**0**	**2**	**2**	**2**	**50**	**0**	**50**

Contents
After completing this Minor Project the student should be able to practice complete process of designing and making of PCB and Electronics circuit design 1. PCB Layout: Drawing PCB layout, standard rules, precautions, use of software like Eagle, ORCAD Layout for PCB layout 2. PCB manufacturing process: Mirror image of PCB layout, printing, exposing, itching, tanning of PCB 3. Fabrication of circuit on PCB: Mounting components, soldering, testing

A group of students (not more than five) should submit the Project Report based on Minor project

References:

1. PCB Design by Boshart, TMH publications.
2. Integrated Circuit Fabrication Technology by Elliot TMH publications. Manuals of ORCAD and Eagle

VI SEMESTER B.E.

ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **6BEET01**

Title of the Course : **CONTROL SYSTEM**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I	**Systems and their Representation** Basic elements in Control Systems, Open loop and Closed loop Systems, Electrical analogy of Mechanical and Thermal Systems, Transfer Function, Block diagram reduction technique, Signal flow graph, Effect of feedback on sensitivity to parameter variation and reduction of the noise.	10
II	**Time Response Analysis** Time response, Time domain specification, Types of test inputs, First and Second order system response, Error coefficient, Generalized error series , Steady State Error, P,PI,PID modes of feedback control.	10
III	**Stability of Control System** Stability of control system, location of roots in S plane for stability, characteristics equation, Routh-Hurwitz criterion, Special cases for determining relative stability, Root locus construction, Root location and its effect on time response, Effect of pole-zero addition on proximity of imaginary axis.	10
IV	**Frequency response methods** Frequency response of linear system, Logarithmic frequency response (Bode) plots from transfer function for various systems, Polar plots for various systems, Estimation of approximate transfer function from the frequency response, Stability analysis from Bode plots, Nyquist criterion, Nyquist Plots and stability analysis.	10
V	**State Space Analysis of Control System** State variable method of analysis, Characteristics of system state, Choice of state variables, representation of vector matrix differential equation, Standard form, relation between transfer function and state variable.	10
	Total	**50**

Text Books -

1. Automatic Control Systems (with MATLAB Programs) by S.Hasan Saeed, S.K.Kataria & Sons.
2. Control System Engineering by Nagrath I.J.Gopal M, Wiley Eastern.
3. Modern Control Systems by Ogata K,Prentice Hall of India.
4. Linear Control Systems by B.S.Manke, Khanna Publication.

Reference Books -

1. Analysis and Design of Control Systems using MATLAB by Rao.V.Dukkipati,New Age.
2. Modern Control System by Richard Dorf,Robert Bishop, IIth edition 2008.

Course Outcomes:

At the end of the course the students will be able to

CO1. Identify open and closed loop control system
CO2. Formulate mathematical model for physical systems.
CO3. Simplify representation of complex systems using reduction techniques.
CO4. Use standard test signals to identify performance characteristics of first and second-order system.
CO5. Apply root locus technique for stability analysis.
CO6. Analyze performance characteristics of system using Frequency response methods.

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 6BEET02

Title of the Course : DIGITAL SIGNAL PROCE SSING

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Units	Contents	Hours
1	Review of Discrete time systems, Z transform & properties, DFT its properties, radix 2 decimation in time FTT and IFFT, radix 2 decimation in frequency FFT & IFFT	10
2	**Structure of FIR and IIR filters:** Structures for realization of discrete time systems, Basic structures for FIR systems: direct form, cascade form, lattice structure, frequency sampling structure. Basic structure for IIR systems: Direct forms I,II, cascade, parallel forms, lattice and lattice-ladder structures, transposed forms.	10
3	**FIR Filters :** Introduction to FIR filters, linear phase filters, symmetric and anti symmetric filters, Window method, frequency sampling method . Design of FIR filters using Kaiser Window. Comparison of design methods for linear phase FIR filters.	09
4	**IIR Filters :** Introduction to IIR filters, Butterworth approximation, Chebyshev approximation, Design of IIR filter: impulse invariance method, bilinear transformation, approximation derivative method, Frequency transformations: low pass to high pass, band pass, band reject. Comparison between FIR and IIR filters	09
5	**Multirate Digital Signal Processing :** Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Implementation of sampling rate conversion, Applications of multi rate signal processing, Introduction to digital filter banks.	09
	Total	**47**

Text Books:

1. Proakis J. G and D. G. Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications", Pearson Education, PHI.
2. Johnson J. R, "Introduction to Digital Signal Processing", PHI
3. P. Ramesh Babu, "Digital Signal Processing", Sci- Tech Publications.
4. Digital Signal Processing by S Salivahanan, C Gnanapriya, TMH,2e

Reference Books:

1. S. K. Mitra, "Digital Signal Processing: A Computer based Approach", TMH, 2001.
2. Oppenheim A. V and R. W. Schafer, "Discrete Time Signal Processing", Person Education, India
3. Rabnier, Gold, "Theory and Applications of Digital Signal Processing", TMH.

Course Outcomes:

At the end of the course the students will be able to

CO1 Evaluate the spectrum of discrete time signals using various transform techniques.
CO2 Demonstrate sampling and reconstruction of Signals.
CO3 Construct the structures for realization of FIR and IIR discrete time systems
CO4 Design FIR & IIR filters using various methods.
CO5 Utilize Sampling rate conversion in Multirate signal processing systems.

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **6BEET03**

Title of the Course : **FIELDS AND RADIATING SYSTEMS**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I	**Transmission Lines:**	
	Basic Principles of Transmission lines, Line Equations, Transmission line parameters, characteristic impedance, propagation constant, attenuation constant and phase constant, reflection coefficient and VSWR, Introduction to Smith Chart And Stub matching.	10
II	**Guided waves and waveguide:**	
	Parallel planes Wave Guide: Field Equation, TE, TM, TEM waves and their characteristics, Attenuation in parallel plane guides, wave impedances. Rectangular waveguides: Field Equation, TM, TE waves in rectangular guides and their characteristics, wave velocity, guide wavelength, wave impedances.	10
III	**Radiation and Antenna:**	
	Scalar and vector potentials, Concept of retarded potentials, field due to a current elements, power radiated and radiation resistance for field due to a dipole, Antenna Parameters: radiation intensity, Directive gain , directivity , antenna gain ,Antenna Efficiency, Effective aperture of an antenna, Effective Length, reciprocity theorem applied to antennas.	8
IV	**Antenna Array:**	
	Various forms of Antenna Arrays: Broadside Array, End Fire Array, Array of Point Sources, Two element arrays and their directional characteristics, linear array analysis of broadside and end-fire arrays, pattern multiplication, binomial arrays, Dolph-Tchebyscheff Array.	9
V	**Practical Antenna:**	
	Parabolic reflectors, Lens antennas, Folded dipole, Turnstile Antenna, Yagi Uda antenna, Log-periodic antennas, Horn antennas, Traveling wave antennas, Cassegrain antenna.	8

Text Books:

1. Edward C. Jordan & Keith G. Balmain ,'Electromagnetic waves and radiating systems', Prentice- Hall, 2006
2. K. D. Prasad, 'Antenna And Wave Propagation', Satya Prakashan

Reference Books:

1. John D. Kraus, 'Electromagnetic', Tata Mcgraw Hill, Book Co. New York .
2. Rajeshwari Chatterjee, 'Antenna Theory and Practice', New Age International (P) Limited.

Course Outcomes:

At the end of the course the students will be able to

CO1 Analyze and interpret the voltage and current distributions on the transmission line

CO2 Solve Maxwell's and wave equations to derive the field equations for waveguides.

CO3 Make use of radiation pattern to measure the antenna parameters.

CO4 Develop the directional characteristics of antenna array.

CO5 Explain different types of Antennas with their applications

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 6BEET04

Title of the Course : PRINCIPLES OF COMMUNICATION ENGINEERING

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Units	Contents	Hours
1	**Wave propagation & Noise** Fundamentals of electromagnetic waves, Ground wave propagation, sky wave, space wave, and troposphere scatter. Electromagnetic frequency spectrum, communication systems, need of modulation and its types. Noise: Sources of noise and its types, signal to noise ratio, noise factor, noise figure, noise temperature, noise equivalent temperature.	10
2	**Amplitude Modulation :** Amplitude modulation (AM), double side band (DSB), double side band suppressed carrier (DSB-SC), single side band (SSB), vestigial side band modulation (VSB): generation, demodulation, Independent side band (ISB) transmission, modulation index, frequency spectrum. Power requirement of these Systems. AM transmitter (broadcast and low power), Noise in AM systems.	09
3	**Angle Modulation :** Generalized concept and features of angle modulation; Frequency modulation (FM): modulation index, power requirement, frequency spectrum, bandwidth, phasor comparison of narrowband FM and AM waves, Generation of FM, Demodulation of FM, interference in FM system, pre-emphasis and de-emphasis techniques, FM receiver, noise in FM receiver. Phase modulation (PM): modulation index, power requirement, frequency spectrum, bandwidth analysis of narrow band FM, wide band FM and PM, interference in angle modulated system, FM transmitter (broadcast and low power). Noise in FM systems	09
4	**Radio Reciever :** TRF and super-heterodyne receiver, AGC, FM receiver, sensitivity, selectivity, image frequency rejection measurements, communication receiver and its special features. Transceivers for wireless mobile communication devices. Types of antenna, radiation pattern, antenna arrays, turnstile, loop, log periodic, UHF and microwave antenna.	09
5	**Analog Pulse Modulation:** Sampling theorem, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), generation & Detection of these pulse modulated signals, Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), Adaptive Delta Modulation (ADM). Time Division Multiplexing (TDM) & Frequency Division Multiplexing (FDM)..	08

Text Books:

1) “Electronic Communication Systems”, “Kennedy”, TMH

References:

1. Introduction to Analog & Digital Communication Systems”, “Haykin Simon”, John Wile
2. “Modern Analog & Digital Communication Systems”, “Lathi B.P”, John Wiley
3. “Communication Electronics Principles and Applications”, “Frenzel”, TMH, 3rd Edition

Course Outcomes:

At the end of the course the students will be able to

CO1 Explain various blocks of communication system.
CO2 Demonstrate generation and detection of various analog modulation techniques.
CO3 Analyze and compare different analog modulation techniques in time and frequency domain
CO4 Interpret the performance characteristics of radio receiver.
CO5 Illustrate generation and detection of various pulse modulation techniques

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **6BEET05**

Title of the Course : **PROGRAM ELECTIVE-II (CMOS DESIGN)**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (hrs)	MSE	IE	ESE	Total
4	**0**	**0**	**4**	**4**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I		
	Review of MOS transistor models, Non-ideal behavior of the MOS Transistor. Transistor as a switch.	9
II		
	Inverter characteristics, Integrated Circuit Layout: Design Rules, Parasitics. Delay: RC Delay model	9
III		
	linear delay model, logical path efforts. Power, interconnect and Robustness in CMOS circuit layout	9
IV		
	Combinational Circuit Design: CMOS logic families including static, dynamic and dual rail logic	10
V		
	Sequential Circuit Design: Static circuits. Design of latches and Flip-flops	8

Text/Reference Books:

1. N.H.E. Weste and D.M. Harris, CMOS VLSI design: A Circuits and Systems Perspective, 4thEdition, Pearson Education India, 2011.

2. C.Mead and L. Conway, Introduction to VLSI Systems, Addison Wesley, 1979.

3. J. Rabaey, Digital Integrated Circuits: A Design Perspective, Prentice Hall India, 1997.

4. P. Douglas, VHDL: programming by example, McGraw Hill, 2013.

5. L. Glaser and D. Dobberpuhl, The Design and Analysis of VLSI Circuits, Addison Wesley, 1985.

Course Outcomes:

At the end of the course the students will be able to

1. Design different CMOS circuits using various logic families along with their circuit layout.

2. Use tools for VLSI IC design.

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **6BEET05**

Title of the Course : **PROGRAM ELECTIVE-II (SCIENTIFIC COMPUTING)**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (hrs)	MSE	IE	ESE	Total
4	**0**	**0**	**4**	**4**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I		
	Introduction: Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability and Accuracy Computer Arithmetic: Floating Point Numbers, Normalization, Properties of Floating Point System, Rounding, Machine Precision, Subnormal and Gradual Underflow, Exceptional Values, Floating - Point Arithmetic, Cancellation	9
II		
	System of liner equations: Linear Systems, Solving Linear Systems, Gaussian elimination, Pivoting, Gauss-Jordan, Norms and Condition Numbers, Symmetric Positive Definite Systems and Indefinite System, Iterative Methods for Linear Systems Linear least squares: Data Fitting, Linear Least Squares, Normal Equations Method, Orthogonalization Methods, QR factorization, Gram-Schmidt Orthogonalization, Rank Deficiency, and Column Pivoting	9
III		
	Eigenvalues and singular values: Eigenvalues and Eigenvectors, Methods for Computing All Eigenvalues, Jacobi Method, Methods for Computing Selected Eigenvalues, Singular Values Decomposition, Application of SVD Nonlinear equations: Fixed Point Iteration, Newton's Method, Inverse Interpolation Method Optimization: One-Dimensional Optimization, Multidimensional Unconstrained Optimization, Nonlinear Least Squares.	9
IV		
	Interpolation: Purpose for Interpolation, Choice of Interpolating, Function, Polynomial Interpolation, Piecewise Polynomial Interpolation Numerical Integration And Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation, Initial Value Problems for ODES, Euler's Method, Taylor Series Method, Runga-Kutta Method, Extrapolation Methods, Boundary Value Problems For ODES	10
V		
	Finite Difference Methods, Finite Element Method, Eigenvalue Problems Partial Differential Equations, Time Dependent Problems, Time Independent Problems, Solution for Sparse Linear Systems, Iterative Methods Fast Fourier Transform, FFT Algorithm, Limitations, DFT, Fast polynomial Multiplication, Wavelets, Random Numbers And Simulation, Stochastic Simulation, Random Number Generators, Quasi-Random Sequences	8

Text/ Reference Books:

1. Heath Michael T., “Scientific Computing: An Introductory Survey”, McGraw-Hill, 2nd Ed., 2002

2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery, “Numerical Recipes: The Art of Scientific Computing”, Cambridge University Press, 3rd Ed., 2007

3. Xin-she Yang (Ed.)., “Introduction To Computational Mathematics”, World Scientific Publishing Co., 2nd Ed., 2008

4. Kiryanov D. and Kiryanova E., “Computational Science”, Infinity Science Press, 1st Ed., 2006

5. Quarteroni, Alfio, Saleri, Fausto, Gervasio and Paola, “Scientific Computing With MATLAB And Octave”, Springer, 3rd Ed., 2010

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the significance of computing methods, their strengths and application areas.

2. Perform the computations on various data using appropriate computation tools.

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : **6BEET05**

Title of the Course : **PROGRAM ELECTIVE-II (NANO ELECTRONICS)**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (hrs)	MSE	IE	ESE	Total
4	**0**	**0**	**4**	**4**	**3**	**10**	**10**	**80**	**100**

Unit	Contents	Hours
I		
	Introduction to nanotechnology, meso structures, Basics of Quantum Mechanics: Schrodinger equation, Density of States.	9
II		
	Particle in a box Concepts, Degeneracy. Band Theory of Solids. Kronig-Penny Model. Brillouin Zones	9
III		
	Shrink-down approaches: Introduction, CMOS Scaling, The nanoscale MOSFET, Finfets, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.)	9
IV		
	Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors	10
V		
	Carbon nanotube electronics, Bandstructure and transport, devices, applications, 2D semiconductors and electronic devices, Graphene, atomistic simulation	8

Text/ Reference Books:

1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson, 2009.
2. W. Ranier, Nanoelectronics and Information Technology (Advanced Electronic Materialand Novel Devices), Wiley-VCH, 2003.
3. K.E. Drexler, Nanosystems, Wiley, 1992.
4. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press, 1998.
5. C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley, 2003

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand various aspects of nano-technology and the processes involved in making nano components and material.
2. Leverage advantages of the nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of nano-technology and theprocesses involved in making nano components and material.
4. Leverage advantages of the nano-materials and appropriate use in solving practical problems.

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 6BEET06

Title of the Course : CONTROL SYSTEM ENGINEERING PRACTICAL

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	2	2	25	25	50

Minimum 8 practical based on Theory syllabus

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 6BEET07

Title of the Course : DIGITAL SIGNAL PROCESSING PRACTICAL

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	2	2	25	25	50

Minimum 8 practical based on Theory syllabus

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 6BEET08

Title of the Course : PRINCIPLES OF COMMUNICATION ENGINEERING PRACTICAL

Course Scheme					Evaluation Scheme(Laboratory)		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	**0**	**2**	**2**	**2**	**25**	**25**	**50**

Minimum 8 practical based on Theory syllabus

List of suggested practical's
1. Study of Amplitude modulation and demodulation.
2. Study of Frequency modulation and Demodulation.
3. Study of AM transmitter And Receiver.
4. Study of FM transmitter and receiver.
5. Study of SSB and DSB.
6. Study of PAM.
7. Study of PWM.
8.Study of PPM
9. Study of Delta Modulation.
10. Study of Adaptive Delta Modulation.
11. Study of TDM.
12. Study of FDM.

SIXTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Code : 6BEET09

Title of the Course : INDUSTRIAL TRAINING/ INTERNSHIP/CASE STUDIES

Course Scheme				Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Credits	TW	POE	Total
0	0	2	2	25	25	50

Two to four weeks of training in an Industry/Institute/Research organization/NGO/Environmental studies. The internship should give exposure to the practical aspects of the discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The outcome of the internship should be presented in the form of a certified report.

 # Industrial Training /Internship/Case Studies:- It is to be completed during the summer vacation after completion of fourth semester and/or winter vacation after the completion of Fifth semester and its planning and allocation should be done during the fourth/ fifth semester and its marks will be awarded in the sixth semester for subject code 6BEET09 on submission of the certified relevant report at the end of sixth semester.