GALGOTIAS UNIVERSITY

Syllabus of

Electronics and Communication Engineering(B.Tech)

Name of School: School of Electrical, Electronic and Communication Engineering

Department: Electronic and Communication Engineering

Year: 2019-23

Curriculum Structure of B.Tech. in Electronics and Communication Engineering,

2019-23

Semester 1						
Sl. No	Course Code	Name of the Course	L	T	P	C
1	BMA101	Mathematics-1 (Multivariable Calculus)	3	1	0	3
2	BMA151	Exploration with CAS-I	0	0	2	1
3	FENG1005	Functional English	2	0	0	2
4	BCS101	Fundamentals of Computer Programing	3	0	0	3
5	BCS151	Fundamentals of Computer Programing Lab - 1	0	0	2	1
6	BPH101	Engineering Physics	3	0	0	3
7	BPH151	Engineering Physics Lab	0	0	2	1
8	BME101	Elements of Mechanical Engineering	3	0	0	3
9	BME151	Workshop Practice	0	0	2	1
	BLE101	Psychology and sociology	2	0	0	2
		Total				
Semester II						
Sl No	Course Codee	Name of the Course	L	T	P	C
1	BMA201	Linear Algebra and Differential Equations	3	1	0	3
2	BMA251	Exploration with CAS-II	0	0	2	1
3	BHS251	Professional Communication Lab	0	0	2	1
4	BCS251	Application of Programming using Python	0	0	2	1
5	BCH102	Engineering Science	3	0	0	3
6	BCH153	Engineering Science Lab	0	0	2	1
7	BEC101	Basic Electrical and Electronics Engineering	3	0	0	3
8	BEC151	Basic Electrical and Electronics Engineering Lab	0	0	2	1
9	Bcs901	Disruptive Technology	0	0	2	1

10	BOC253	Design and Innovation	0	0	2	1
11	BME152	Engineering Graphics	0	0	4	2
		Total				

Semester III									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BECE2015	Electronic Devices and Circuits	3	0	0	3	20	30	50
2	MATH2001	Functions of Complex Variables and Transforms	3	0	0	3	20	30	50
3	BTEE2002	Network Analysis and Synthesis	3	0	0	3	20	30	50
4	BEE01T2001	Sensors and Transducers	2	0	0	1	20	30	50
5	BEE01T2002	Design and Engineering	2	0	0	2	20	30	50
6	BECE2010	Digital Electronics	3	0	0	3	20	30	50
7	BECE2012	Electromagnetic Field Theory	3	0	0	3	20	30	50
8	BECE2011	Digital Electronics Lab	0	0	2	1	50	-	50
9	BEE01P2003	Engineering Clinic-I	0	0	2	2	50	-	50
10	SLBT2021	English Proficiency and Aptitude Building - 3	0	0	2	1	50	-	50
11	BEE01P2004	IoT Lab	0	0	2	2	50	-	50
		Total	19	0	8	24			
		Total				24			

Semester IV									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	MATH2004	Probability and Stochastic Process	3	0	0	3	20	30	50
2	BECE2008	Integrated Circuits	3	0	0	3	20	30	50
3	BECE2016	Signals and Systems	3	0	0	3	20	30	50
4	ECE417	Analog and Digital Communication	3	0	0	3	20	30	50
5	BEE01T2005	Database Management System	2	0	1	2	20	30	50
6	BEE01T2006	Microcontrollers and Embedded System	3	0	0	2	20	30	50
7	BEE01P2007	Engineering Clinic-2	0	0	2	2	50	-	50
8	BECE2009	Integrated Circuits Lab	0	0	2	1	50	-	50
9	SLBT2022	English Proficiency and Aptitude Building-IV	0	0	4	2	50	-	50

10	BECE3005	Microprocessor and Micro Controller Lab	0	0	2	1	50	-	50
		Total	18		8	22			
Semester V									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BEEE3002	Control System	3	0	0	3	20	30	50
2	BEE01T3001	EM Waves	3	0	0	3	20	30	50
3	BEE01P3002	Python and Data Structures	0	0	2	1	50	-	50
4	BECE3020	Digital Signal Processing	3	0	0	3	20	30	50
5	********	Program Elective-I	3	0	0	3	20	30	50
6	********	Program Elective-II	3	0	0	3	20	30	50
7	BEE01P3003	Engineering Clinic-3(Industrial Internship)	0	0	2	2	50	-	50
8	BLL551	Effective Leadership and Decision Making Skills	0	0	2	1	50	-	50
9	BECE3021	Digital Signal Processing Lab	0	0	2	1	50	-	50
10	BLE601/BLE602/ BLE603	Foreign Language - 1 (German, Japanese, French) *Optional	0	0	2	0	50	-	50
11	BEE01P3004	Communication Engineering Lab	0	0	2	1	50	-	50
		Total				21			
Semester VI									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BLL601	Campus to Corporate program	3	0	0	3	50	-	50
2	BEE01T3005	Advanced Communication Systems	3	0	0	3	20	30	50
3	BECE3013	VLSI Design	3	0	0	3	20	30	50
4	BEE01T3006	Image Processing and Pattern Recognition	3	0	0	3	20	30	50
5	********	Program Elective-III	3	0	0	3	20	30	50
6	********	Program Elective-IV	3	0	0	3	20	30	50
8	BEE01P3007	Design and Innovation Project(Communication Based)	0	0	2	1	50	-	50
9	BEE01T3008	Professional Ethics and Human Values	2	0	0	1	50	-	50
10	BEE01P3009	VLSI and Embedded Systems Lab	0	0	2	1	50	-	50
		Total	20		4	21			
Semester VII									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BEE01T4001	Communication Networks	3	0	0	3	20	30	50
2	********	Open Elective -1	3	0	0	3	20	30	50

3	********	Program Elective-V	3	0	0	3	20	30	50
4	********	Program Elective-VI	3	0	0	3	20	30	50
5	********	Open Elective-2	3	0	0	3	20	30	50
6	BEE01P4002	Communication Networks Lab	0	0	2	1	50	-	50
7	BECE9998	Capstone Design - I	0	0	4	2	50	-	50
		Total							

Semester VIII									
Sl No	Course Code	Name of the Course					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
1	BECE9999	Capstone Design - I	0	0	4	2	50	-	50
		Total							

List of Electives

Elective-1

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
IoT									
1	BECE4501	Introduction to IoT and its Applications	3	0	0	3	20	30	50
2	BECE3102	Automation and Robotics	3	0	0	3	20	30	50
3	BEE01T4022	Deep Learning Algorithms	3	0	0	3	20	30	50
4	BEE01T3021	Object Oriented Programming	3	0	0	3	20	30	50
5	BEE01T5021	Virtual Reality	3	0	0	3	20	30	50
6	BEE01T5022	Raspberry Pi and its applications	3	0	0	3	20	30	50
7	BEE01T2021	Introduction to Arduino programming and its applications	3	0	0	3	20	30	50
8	BEE01T4022	Cloud Computing	3	0	0	3	20	30	50
9	BEE01T2022	Python Programming	3	0	0	3	20	30	50

Elective-2

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
Biomedical Engineering and Healthcare									
1	BEE01T2022	Medical Imaging	3	0	0	3	20	30	50
2	BEE01T2024	Biosignal processing	3	0	0	3	20	30	50
3	BEE01T3022	Medical Image Processing	3	0	0	3	20	30	50
4	BEE01T3023	Biomedical Sensors and Measurement Devices	3	0	0	3	20	30	50
5	BEE01T3024	Biomaterials and Artificial Organs	3	0	0	3	20	30	50

6	BEE01 T4023	Assist Devices	3	0	0	3	20	30	50
7	BECE4 401	Soft Computing Techniques	3	0	0	3	20	30	50
8	BEE01 T5023	Hospital Engineering and Informatics Systems	3	0	0	3	20	30	50
9	BEE01 T2025	BioChemistry	3	0	0	3	20	30	50

Elective – 3

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE
VLSI									
1	BEE01 T3025	ASIC Design	3	0	0	3	20	30	50
2	BEE01 T3026	CAD Algorithms for VLSI Physical Design	3	0	0	3	20	30	50
3	BEE01 T2026	Digital VLSI Design	3	0	0	3	20	30	50
4	BECE3 104	Digital System Design using VHDL	3	0	0	3	20	30	50
5	BEE01 T4024	SoC Design	3	0	0	3	20	30	50
6	BEE01 T4025	System Verilog	3	0	0	3	20	30	50
7	BEE01 T4026	Low Power VLSI Design	3	0	0	3	20	30	50
8		VLSI Technology	3	0	0	3	20	30	50
9	BEE01 T5024	VLSI Testing	3	0	0	3	20	30	50
10	BEE01 T5025	MEMS	3	0	0	3	20	30	50
11	BEE01 T5026	Memory Design and Testing	3	0	0	3	20	30	50
12	BEE01 T5027	MOS Transistor Theory	3	0	0	3	20	30	50

Elective – 4

Sl No	Course Code	Name of the Electives					Assessment Pattern		
			L	T	P	C	IA	MTE	ETE

Communication and Networking									
1	BECE3103	Satellite Communication	3	0	0	3	20	30	50
2	BEE01T3027	Principles of Secure Communication	3	0	0	3	20	30	50
3	BEE01T3028	Microwave Theory and Techniques	3	0	0	3	20	30	50
4	BECE3204	Mobile Ad Hoc Networks	3	0	0	3	20	30	50
5	BECE4402	Mobile Computing	3	0	0	3	20	30	50
6	BECE3006	Microwave Engineering	3	0	0	3	20	30	50
7		Information Theory and Coding	3	0	0	3	20	30	50
8	BEE01T4027	Radar Guidance and Navigation	3	0	0	3	20	30	50
9	BECE3016	Optical Communication	3	0	0	3	20	30	50
10	BECE3203	Wireless Sensor Networks	3	0	0	3	20	30	50
11	BEE01T4028	Opto Electronics	3	0	0	3	20	30	50

Elective – 5

Sl No	**Course Code**	**Name of the Electives**					**Assessment Pattern**		
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**
Signal Processing									
1	BEE01T4021	Image and Video Signal Processing	3	0	0	3	20	30	50
2	BEE01T5028	Multimedia Signal Processing and Networking	3	0	0	3	20	30	50
3	BEE01T3029	Speech and Audio Processing	3	0	0	3	20	30	50
4	BEE01T2027	Machine learning	3	0	0	3	20	30	50
5	BEE01T2028	Image Processing using MATLab	3	0	0	3	20	30	50
6	BEE01T2029	Introduction to Scilab and its applications	3	0	0	3	20	30	50

7	BEE01 T5029	Human Computer Interface	3	0	0	3	20	30	50
8	BEE01 T5030	Advanced Digital Signal Processing	3	0	0	3	20	30	50
9	BECE4 401	Soft Computing	3	0	0	3	20	30	50
10	BEE01 T5031	Mixed Signal Circuit Design	3	0	0	3	20	30	50
11	BECE3 304	Neural Networks and Fuzzy Control	3	0	0	3	20	30	50
12	BEEC3 305	Neural Networks and Deep Learning	3	0	0	3	20	30	50

Course Code	BEC101	Course Name	Basic Electrical and Electronics Engineering

Course Objectives

1. To develop solid foundation for further study of electrical and electronics courses
2. To develop the analytical skills for solving the electrical and electronics circuits
3. To learn the utility of basic electronics devices and circuits
4. To understand the basic principles of electrical machines

Prerequisites: Basic Number System, Basic Electronics, Mathematics

Course Outcomes

CO1	Summarize the basic network theorems and laws, Boolean algebra, BJT characteristics, principle of different types of electrical machines
CO2	Solve and analyze transient and steady state of AC and DC network, phasors, representation and conversion of data, Synthesis of logic circuits, BJT and diode biasing, wave shaping circuits and operation of the machines
CO3	Apply the AC and DC theorems and laws in networks circuits, Boolean algebra, BJT characteristics, operation of the machines
CO4	Demonstrate AC and DC network circuits using network theorems and laws, Boolean logic circuits, BJT biasing and its characteristics, connections and testing of the machines
CO5	Understand transformer and motor basic characteristic and working

Text Book :

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical and Electronics Engineering”, McGraw Hill, 20016.

1. V. Mittle and Arvind Mittle, “Basic Electrical Engineering”, McGraw Hill, 2005.

2. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 9th Edition, Pearson Education, 2007.

3. A. P. Malvino and Donald Leach, “Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006.

Reference Books

1. D. C. Kulshreshtha,”Basic Electrical Engineering”, Tata McGraw Hill, 2009.
2. J. Edminister and M. Nahvi , “Electric Circuits”, 3rd Edition, Tata McGraw-Hill, New Delhi, 2002.
3. Jacob Millman, Christos C. Halkias, Satyabrata Jit, “Electronics Devices and Circuits”, 3rd Edition, Tata McGraw Hill, 2008

Syllabus

Unit I: Elementary Circuit Analysis

Ohm’s law, KCL, KVL, node voltage analysis, mesh current, circuits with independent sources, Thevenin’s & Norton’s equivalent, maximum power transfer and superposition theorem.

Unit II: Analysis of DC and AC Circuits

RL and RC transients in circuits with DC source, RMS values, the use of phasors for constant frequency sinusoidal sources, steady state AC analysis of a series circuit, parallel circuits, AC power calculations.

Unit III: Digital Systems

Basic logic circuit concepts, Basic Gates and Universal Gates, representation of numerical data in binary form – Binary to decimal, Octal, Hexadecimal, Boolean algebra, combinational logic circuits- Half adder, full adder, synthesis of logic circuits, minimization of logic circuits.

Unit IV: Semiconductor Devices

Basic diode concepts, ideal diode model, rectifier and wave-shaping circuits, zener diode voltage regulator concepts, bipolar junction transistors, current and voltage relationship, common emitter characteristics.

Unit V: Electro-mechanics

Transformers-Ideal and real transformers, Construction, Principle of operation of transformer, E.M.F Equation, Phasor diagram of transformer, Losses, efficiency. D.C Machines-Construction, principles of rotating DC machines, Types of Excitations-separately excited and self excited (shunt, series and compound) DC machines. Three phase induction motors-Construction, Principle of operation, synchronous speed, slip, and frequency of rotor emf. Synchronous Machines-construction, principle of operation of synchronous motor and applications.

Name of The Course	Electronic Devices and Circuits			
Course Code	BECE2015			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

To acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices

Course Outcomes

CO1	Realize the transistor biasing methods and Design analog electronic circuits using discrete components
CO2	Design common amplifier circuits and analyze the amplitude and frequency responses
CO3	Design various analog circuits to analyze their responses
CO4	Understand the principle of operation of different Oscillator circuits.
CO5	Understand the principle of operation of various amplifier circuits
CO6	Understand the recent trends and practical applicationsof electronic devices

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction 8 hours
BJT and BJT Biasing .Hybrid models of CE, CB, CC, configurations – Study of the effect of emitter by- pass condenser at low frequencies - Hybrid – π common emitter transistor model – hybrid π conductance and capacitance – CE short circuit current gain – current gain with resistive load – gain bandwidth product – Study of the effect of un bypassed emitter resister on amplifier performance, Cascode amplifier. HF & LF compensation of RC coupled amplifier. Multistage Amplifiers.
Unit-2FET and FET Biasing8 hours
FET and FET Biasing. FET Amplifiers: Common source, Common gate and Common drain Amplifiers – problems. Small signal analysis of FET Amplifiers. High Frequency analysis of FET Amplifiers, VMOS & CMOS Concepts.
Unit-3Feedback amplifiers 8 hours
The feedback concept – Transfer gain with feedback – general characteristics and advantages of negative feedback– analysis of voltage series, Voltage shunt, current series and current shunt feedback

amplifiers – Study of the effect of Negative feedback on Gain, Bandwidth, Noise, Distortion, Input and Output impedances with the help of Block Schematic and Mathematical Expressions
Unit-4Oscillators 8 hours
Sinusoidal oscillators –phase shift oscillator – Wien bridge oscillator – Hartley oscillator – Colpits oscillator – frequency stability, inclusive of design, Crystal oscillators.
Unit-5Tuned amplifiers 8 hours
Characteristics of Tuned amplifiers – Analysis of Single tuned, Doubled tuned and stagger tuned amplifiers, Gain – bandwidth product – High frequency effect – neutralization. Power Amplifiers: Classification of amplifiers – class A large signal amplifiers – second harmonic distortion – higher order harmonic generations – computation of Harmonic distortion – Transformer coupled audio power amplifier – efficiency – push - pull amplifier – class B amplifier – class AB operation – Push-Pull circuit with Transistors of Complimentary Symmetry.
Unit-6 Recent trends and Application 8 hours
Trend of Energy Saving in Electronic Devices, Application of oscillators- springs and damping, shock absorber in cars, Pendulum

Suggested Reading

1. 1.Jacob. Millman, Christos C.Halkias, 'Electronic Devices and Circuits', Tata McGraw Hill Publishing Limited, New Delhi, 2008, ISBN 0070634556, 9780070634558.
2. Jacob Millman and C. Halkias, 'Integrated Electronics – Analog and Digital Circuits and Systems', Tata Mc Graw Hill, 2001, ISBN 0074622455, 9780074622452
3. Electronic Devices & Circuits Theory – Robert Boylestad and Louis Nashelsky, 10th EditionPrentice Hall, 2009, ISBN 0135026490, 9780135026496

Name of The Course	Sensors and Transducers				
Course Code	BEE01T2001				
Prerequisite					
Co-requisite					
Anti-requisite					
	L	T	P	C	
	3	0	0	3	

Course Objectives

1. To make students familiar with the constructions and working principle of different types of sensors and transducers.
2. To gain an in-depth understanding of the operation of microcontrollers, machine language programming & interfacing techniques with peripheral devices
3. To gain an understanding of applications of microcontroller in designing processor-based automated electronics system.

Course Outcomes

CO1	Apply network theorems for the analysis of electrical circuits
CO2	Obtain the transient response of electrical circuits
CO3	Obtain the steady-state response of electrical circuits
CO4	Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
CO5	Analyze two port circuit behavior.
CO6	Analyze the sensors used in IoT applications

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

UNIT-I: TRANSDUCERS 8-HOURS
Introduction to transducer, classification and characteristics of transducers, Resistive Transducers: principle of resistive strain gauge, signal conditioning circuit, Displacement Transducers: L.V.D.T, applications. Temperature Transducers: resistance temperature detectors (RTD), thermocouple. pressure transducers: diaphragm pressure transducer.
UNIT-II: SENSORS 8-HOURS
Introduction to sensors , classification, difference between transducer and sensors, Radiation Sensors: LDR, photodiodes - construction and response. Capacitive Sensor : stretched diaphragm type – microphone - construction and characteristics, ultrasonic sensor, optical sensor, magnetic sensor, sensor interface: signal processing ,introduction to smart sensor .
UNIT-III: MICROCONTROLLER 8-HOURS

Introduction to single chip microcontrollers, 8051-architecture –instruction sets , addressing modes, memory organizations, assembly language programming, programming interrupts, timers and serial communication .
UNIT-IV: IOT & EMBEDDED SYSTEM 8-HOURS
Introduction to IoT, physical design of IoT, logical design of IoT- functional blocks of IoT, challenges in IoT. introduction to embedded system ,difference between CISC and RISC Architecture, embedded system design methodologies, embedded controller design for communication, digital control.
UNIT-V: INTERFACING 8-HOURS
Sensors interfacing with embedded controller, ADC, DAC ,LCD, weather monitoring system, water monitoring system, line follower robot ,distance sensor interface .
UNIT-VI Sensor used in industry for IoT Application Development 6 hrs
Temperature Sensor,Proximity sensos, Water Quality sensors, Gas Sensors, Smoke sensors, IR sensors, Motion Detection sensors

Suggested Reading

1. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation' Dhanpat Rai and Co 2004.
2. D.V.S.Murty ,Transducers and instrumentations , 2nd edition, Prentice Hall of India,2012.
3. Mohammad Ali Mazidi and Janice Gillispie Maszidi "The 8051 Microcontroller and Embedded Systems" Pearson education, 2003, ISBN- 9788131710265, 2ndEdition
4. D. Patranabis, Sensors and Transducers, 2nd edition, Prentice Hall of India, 2010. E.A.
5. Microcontrollers: Architecture, Programming, Interfacing and System Design" ,Raj Kamal, "Pearson Education, 2005.
6. "The 8051 Microcontroller Architecture, Programming & Applications", 2e Kenneth .Ayala ;, Penram International, 1996 / Thomson Learning 2005.

Name of The Course	Design and Engineering			
Course Code	BEE01T2002			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	0	3

Course Objectives

1. To excite the student on creative design and its significance;
2. To make the student aware of the processes involved in design;
3. To make the student understand the interesting interaction of various segments of humanities, sciences and engineering in the evolution of a design;
4. To get an exposure as to how to engineer a design.

Course Outcomes

CO1	Realize the different elements involved in good engineering designs and apply them in practice when called for.
CO2	Explain the product oriented and user oriented aspects that make the design a success.
CO3	Implement innovative designs incorporating different segments of knowledge gained.
CO4	Analyse the existing resources and select the apt resources and modern design tools.
CO5	Illustrate the perspective of design covering function, cost, environmental sensitivity, safety and other factors other than engineering analysis.
CO6	Explain the Engineering Design created proficiently to the society.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
20	30	50	100

Course Content:

Unit-1 Introduction 8 hours
Design and its objectives; Design constraints, Design functions, Design means and Design from; Role of Science, Engineering and Technology in design; Engineering as a business proposition; Functional and Strength Designs. Design form, function and strength;
Unit-2Design process 8 hours
Design process- Different stages in design and their significance; Defining the design space; Analogies and “thinking outside of the box”; Quality function deployment-meeting what the customer wants; Evaluation and choosing of a design.
Unit-3Prototyping8 hours
Prototyping- rapid prototyping; testing and evaluation of design; Design modifications; Freezing the design; Cost analysis. Engineering the Design – from prototype to product; Planning, Scheduling, Supply

chains, Inventory, handling, manufacturing/ construction operations; storage, packaging, shipping, marketing, feedback on design.
Unit-4 Design Attributes 8 hours
Product Centered and User Centered design, Product centered attributes and user centered attributes; Value engineering, concurrent engineering and reverse engineering in design; Culture based Design.
Unit-5 Modular Design 8 hours
Modular Design, design optimization, Intelligent and autonomous products, User interfaces, communication between products; autonomous products, internet of things; human psychology and the advanced products. IPR, product liability.
Unit–6 Technology Trends in Engineering Design 8 Hours
Introduction: Digital Twins, Artificial Intelligence, Robotics, 3D Printing, Generative Design

Suggested Reading

1. Balmer, R. T., Keat, W. D., Wise, G., and Kosky, P., Exploring Engineering, Third Edition: An Introduction to Engineering and Design - [Part 3 - Chapters 17 to 27], ISBN-13: 978-0124158917 ISBN-10: 0124158919
2. Dym, C. L., Little, P. and Orwin, E. J., Engineering Design - A Project based introduction- Wiley, ISBN-978-1-118-32458-5
3. Eastman, C. M. (Ed.), Design for X Concurrent engineering imperatives, 1996, ISBN 978-94-011-3985-4 Springer

Name of The Course	DataBase Management System				
Course Code	BEE01T2005				
Prerequisite					
Corequisite					
Antirequisite					
		L	T	P	C

Course Objectives:

The scope of the course is Database System concepts and major application areas. The objective is to understand various data models and to develop the relational model of database including the rigorous practice of query language, SQL. The emphasis is to apply the concepts to wide range of applications.

Course Outcomes

CO1	Understand the relational database theory, application of database system in real life.
CO2	Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
CO3	Learn and apply Structured query language (SQL) for database definition and database manipulation.
CO4	Illustrate relational database theory, and be able to write relational algebra expressions for queries.
CO5	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO6	Illustrate the Concept of stored procedures and functions.

Course Content:

Unit I	Introduction:	10 Hrs
Introduction: An overview of database management system, database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML.		
Unit II	Data Model and ER Diagram	8 Hrs
Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model.		
Unit III	Relational data Model	7 Hrs
Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.		
Unit IV	Database Language	8 Hrs
Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus.		

Unit V	Data Base Normalization	7 Hrs
Functional dependencies, normal forms, first, second, third normal forms, BCNF		
Unit VI Database modifications using SQL. 6 hrs		
Database modifications using SQL. . PL/SQL: Basic Concepts-SQL within PL/SQL- Cursors -Concept of stored procedures and functions-packages-Triggers.		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Name of The Course	Analog and Digital Communication				
Course Code	ECE417				
Prerequisite	Signals and Systems, Digital System Design				
Corequisite					
Antirequisite					
		L	T	P	C
		3	0	0	3

Course Outcomes

CO1	Analyze and compare different analog modulation schemes for their efficiency and bandwidth
CO2	Analyze the behavior of a communication system in presence of noise
CO3	Investigate pulsed modulation system and analyze their system performance
CO4	Analyze different digital modulation schemes and can compute the bit error performance
CO5	Analyze Source and Error control coding.
CO6	Utilize multi-user radio communication

Unit-1 Introduction Review of signals and systems 8 hours
Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.
Unit-2 Probability and random process 8 hours
Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.
Unit-3Pulse modulation 8 hours
Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM),Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.
Unit-4Elements of Detection Theory 8 hours
Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion.
Unit-5Pass band Digital Modulation schemes 8 hours
Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying. Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels.
UNIT 6 MULTI-USER RADIO COMMUNICATION 8 hrs
Advanced Mobile Phone System (AMPS) – Global System for Mobile Communications (GSM) – Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse – Channel Assignment and Hand – Overview of Multiple Access Schemes – Satellite Communication – Bluetooth.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
20	30	50	100

Suggested Reading

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering'',John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication'', Kluwer Academic Publishers, 2004.
6. Proakis J.G., ``Digital Communications'', 4th Edition, McGraw Hill, 2000

Course Code	BTEE2002	Course Name	Network Analysis and Synthesis

Course Objectives

1. To learn the concepts of network analysis in electrical and electronics engineering.
2. To learn linear circuit analysis, graph theory and network theorems.
3. Analyze two port networks using Z, Y, ABCD and h parameters

Course Outcomes

CO1	Analyze an electric network using graph theory
CO2	Solve the electric networks using different network theorems e.g. Thevenin's theorem, superposition theorem and maximum power transfer theorem etc
CO3	Synthesize an electric network using driving point and transfer functions
CO4	Analyze LTI systems using two ports networks
CO5	Design active and passive filter circuits

Text Books

1. M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India
2. A C.L Wadhwa, "Network Analysis and Synthesis" New Age International Publishers, 2007,
3. D.RoyChoudhary, "Networks and Systems" Wiley Eastern Ltd.

Reference Books

1. M.E. Van Valkenburg, "An Introduction to Modern Network Synthesis",Wiley Eastern Ltd.
2. A.Chakrabarti, "Circuit Theory" DhanpatRai& Co

Unit I: Graph Theory

Loop and Nodal methods of analysis, Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality.

Unit II: Network Theorems (Applications to ac networks)

Super-position theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem. Millman's theorem, Compensation theorem, Tellegen's theorem.

Unit III: Network Functions and Transient analysis

Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, transient analysis of ac & dc systems.

Unit IV : Two Port Networks

Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, T & Π Representation.

Unit V: Network Synthesis & Filters

Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms. Image parameters and characteristics impedance, passive and active filter fundamentals, low pass, high pass, (constant K type) filters, and introduction to active filters.

Course Code	BECE2010	Course Name	Digital Electronics

Course Objectives

1. Understanding the numbering systems and their transformations used in computerized system
2. Simplification of logic expressions and realize to design combinational and sequential digital circuits
3. Analyzing the operation and design constraints of CMOS and TTL circuit for logic fabrication.
4. To gain an in-depth understanding of VHDL and to realize different circuits using it both sequential and combinational
5. To learn the concept of memories and how they are designed using VHDL

Prerequisites: Number system

Course Outcomes

CO1	Smooth understanding on digital circuits with inputs/outputs
CO2	Understand the logic circuits, minimize and design the circuits through K-map reduction
CO3	Design a combinational logic circuits like: adder, substractor, multiplexer and demultiplexers
CO4	Design digital register with using different types of flip flops
CO5	Design a circuit of combinational/sequential VHDL platform

TEXT BOOKS

1. Mano, Morris. "Digital logic." *Computer Design. Englewood Cliffs Prentice-Hall* (1979).
2. Kumar, A. Anand. *Fundamentals Of Digital Circuits 2Nd Ed*. PHI Learning Pvt. Ltd., 2009.
3. Taub, Herbert, and Donald L. Schilling. *Digital integrated electronics*. New York: McGraw-Hill, 1977.
4. Stephen Brown and Zvonko Vranesic," Fundamentals of Digital Logic with VHDL Design" , Mc-Graw-Hill (2nd edition).*ISBN*-10: 0077211642

REFERENCE BOOKS

1. Floyd, Thomas L. *Digital Fundamentals, 10/e*. Pearson Education India, 1986.
2. Malvino, Albert Paul, and Donald P. Leach. *Digital principles and applications*. McGraw-Hill, Inc., 1986.
3. Jain, Rajendra Prasad. *Modern Digital Electronics 3e*. Tata McGraw-Hill Education, 2003.

Syllabus

Unit I: Number System & Boolean Algebra

Review of number system; types and conversion, codes. Boolean algebra: De-Morgan's theorem, switching functions, Prime Implicants and Essential Prime Implicants definition and simplification using K-maps upto 5 variables & Quine McCluskey method.

Unit II: Combinational Circuits

Introduction to Logic Gates: AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR and their combinations. Design of adder, subtractors, comparators, code converters, encoders, decoders, multiplexers and de-multiplexers, Function realization using gates & multiplexers.

Unit III: Synchronous Sequential Ciruits

Introduction to Latches and Flip flops - SR, D, JK and T. Design of synchronous sequential circuits – Counters, shift registers. Finite State Machine Design, Mealy, Moore Machines, Analysis of synchronous sequential circuits;, state diagram; state reduction; state assignment with examples.

Unit IV: Introduction VHDL

INTRODUCTION to Hardware Description Languages (HDL) and HDL based design, VHDL- Variables, Signals and constants, Arrays, VHDL operators, VHDL functions, VHDL procedures, Packages and libraries, VHDL description of combinational networks, Modeling flip-flops using VHDL, VHDL models for a multiplexer, Compilation and simulation of VHDL code, Modeling a sequential machine, VHDL model for a counter.

Unit V: VHDL Synthesis and Models

Attributes, Transport and Inertial delays, Operator overloading, Multivalued logic and signal resolution, IEEE-1164 standard logic, Generics, Generate statements, Synthesis of VHDL code, Synthesis examples, Files and TEXTIO.

Course Code	BECE2012	Course Name	Electromagnetic Field Theory

Course Objectives

- To gain conceptual and basic mathematical understanding of electric and magnetic fields in free space and in materials
- To understand the coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations
- To understand wave propagation in lossless and in lossy media
- To be able to solve problems based on the above concepts

Course Outcomes

CO1	Apply coordinate systems and transformation techniques to solve problems on Electromagnetic Field Theory
CO2	Apply the concept of static electric field and solve problems on boundary value problems.
CO3	Analyze the concept of static magnetic field and solve problems using Biot - Savart's Law, Ampere's circuit law, Maxwell's equation.
CO4	Understands magnetic forces, magnetic dipole and magnetic boundary conditions.
CO5	Understands the time-varying Electromagnetic Field and derivation of Maxwell's equations.

Reference Books

1. Principles of Electromagnetics N. O. Sadiku, Oxford University Press Inc
2. Engineering Electromagnetics W H Hayt, J A Buck, McGraw Hill Education
3. Electromagnetic Waves, R.K. Shevgaonkar, Tata McGraw Hill India, 2005
4. Electromagnetics with Applications, Kraus and Fleish, Edition McGraw Hill International Editions, Fifth Edition, 1999Syllabus

Syllabus

UNIT I STATIC ELECTRIC FIELDS

Introduction to Co-ordinate System – Rectangular –Cylindrical and Spherical Co- ordinate System – Introduction to line, Surface and Volume Integrals – Definition of Curl, Divergence and Gradient – Meaning of Stokes theorem and Divergence theorem Coulomb's Law in Vector Form – Definition of Electric Field Intensity – Principle of Superposition – Electric Field due to discrete charges – Electric field due to continuous charge distribution – Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field due to an infinite uniformly charged sheet.Electric Scalar Potential – Relationship between potential and electric field – Potential due to infinite uniformly charged line – Potential due to electrical dipole – Electric Flux Density – Gauss Law – Proof of Gauss Law – Applications

UNIT II: STATIC MAGNETIC FIELDS

The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I –Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications. Magnetic flux density The Lorentz force equation for a moving charge and applications, Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I – Magnetic moment – Magnetic Vector Potential.

UNIT III: ELECTRIC AND MAGNETIC FIELDS IN MATERIALS

Poisson's and Laplace's equation – Electric Polarization-Nature of dielectric materials- Definition of Capacitance – Capacitance of various geometries using Laplace's equation– Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law – continuity equation for current.Definition of Inductance – Inductance of loops and solenoids – Definition of mutual inductance – simple examples. Energy density in magnetic fields – Nature of magnetic materials – magnetization and permeability – magnetic boundary conditions.

UNT IV: TIME VARYING ELECTRIC AND MAGNETIC FIELDS

Faraday's law – Maxwell's Second Equation in integral form from Faraday's Law – Equation expressed in point form.Displacement current – Ampere's circuital law in integral form – Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form. Maxwell's four equations in integral form and differential form.Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

UNIT V: ELECTRO MAGNETIC WAVES

Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material.Wave equation for a conducting medium – Plane waves in lossy dielectrics –Propagation in good conductors – Skin effect. Linear, Elliptical and circular polarization – Reflection of Plane Wave from a conductor – normal incidence – Reflection of Plane Waves by a perfect dielectric – normal and oblique incidence. Dependence on Polarization, Brewster angle.

Course Code	BECE2016	Course Name	Signals and Systems

Course Objectives

This subject is about the mathematical representation of signals and systems. The most important representations we introduce involve the *frequency domain* – a different way of looking at signals and systems, and a complement to the time-domain viewpoint. Indeed engineers and scientists often think of signals in terms of frequency content, and systems in terms of their effect on the frequency content of the input signal. Some of the associated mathematical concepts and manipulations involved are challenging, but the mathematics leads to a new way of looking at the world.

Prerequisites: Engineering Mathematics

Course Outcomes

CO1	Understand about various types of signals, classify them, analyze them, and perform various operations on them.
CO2	Understand about various types of systems, classify them, analyze them and understand their response behaviour
CO3	Appreciate use of transforms in analysis of signals and system.
CO4	Carry simulation on signals and systems for observing effects of applying various properties and operations.
CO5	Create strong foundation of communication and signal processing to be studied in the subsequent semester

Text Book:

1. P. Ramakrishna Rao, `Signal and Systems' 2008 Ed., Tata McGraw Hill, New Delhi, ISBN 1259083349, 9781259083341

Reference Books

Signals and Systems by Oppenheim & Wilsky

Syllabus

Unit I: Introduction to Signals

Definition, types of signals and their representations: continuous-time/discrete-time, periodic/non-periodic, even/odd, energy/power, deterministic/ random, one dimensional/ multidimensional; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships),exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables)

Unit II: Laplace-Transform (LT) and Z-transform (ZT)

One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC), One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping

Unit III: Fourier Transforms (FT):

Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT, Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT.

Unit IV :Introduction to Systems

Classification, linearity, time-invariance and causality, impulse response, characterization of linear time-invariant (LTI) systems, unit sample response, convolution summation, step response of discrete time systems, stability, convolution integral, co-relations, signal energy and energy spectral density, signal power and power spectral density, properties of power spectral density.

Unit V: Time and frequency domain analysis of systems

Analysis of first order and second order systems, continuous-time (CT) system analysis using LT, system functions of CT systems, poles and zeros, block diagram representations; discrete-time system functions, block diagram representation, illustration of the concepts of system bandwidth and rise time through the analysis of a first order CT low pass filter.

Course Code	BECE2008	Course Name	Integrated Circuits

Course Objectives

- To introduce the basic building blocks of linear integrated circuits
- To learn the linear and non-linear applications of operational amplifiers
- To introduce the theory and applications of analog multipliers and PLL
- To learn the theory of ADC and DAC
- To introduce the concepts of waveform generation and introduce some special function ICs

Course Outcomes

CO1	Illustrate the AC, DC characteristics and compensation techniques of Operational Amplifier
CO2	Realize the applications of Operational Amplifiers
CO3	Clarify and Analyze the working of Analog Multipliers and PLL
CO4	Classify and realize the working principle of various converter circuits using Op-Amps
CO5	Demonstrate the function of various signal generators and Waveform Shaping Circuits

Text Books:

1. Sergio Franco, " Design with operational amplifiers and analog integrated circuits ", McGraw Hill, 2002, ISBN 0070530440, 9780070530447
2. Ramakant A. Gayakwad, " OP - AMP and Linear IC's ", 4th Edition, Prentice Hall, 2000, ISBN 0132808684, 9780132808682

Reference Books:

1. Botkar K.R., " Integrated Circuits ", Khanna Publishers, 1996.
2. Taub and Schilling, " Digital Integrated Electronics ", Tata McGraw-Hill Education, 2004, ISBN 0070265089, 9780070265080
3. Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill, 2001, ISBN 0074622455, 9780074622452Syllabus

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Unit-1

Analysis of difference amplifiers, Monolithic IC operational amplifiers, specifications, frequency response of op-amp,, slew rate and methods of improving slew rate, Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers.

Unit-2

Differentiator, Integrator, Voltage to Current convertor, Low pass, high pass, band pass filters, comparator, Multi-vibrator and Schmitt trigger, Triangle wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator, Sine wave Oscillators.

Unit-3

Analysis of four quadrant and variable trans-conductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, Frequency synthesizers, Compander ICs.

Unit-4

Analog switches, High speed sample and hold circuits and sample and hold IC's, Types of D/A converter-Current driven DAC, Switches for DAC, A/D converter, Flash, Single slope, Dual slope, Successive approximation, Voltage to Time and Voltage to frequency converters.

Unit-5

Wave shaping circuits, Multivibrator- Monostable & Bistable, Schmitt Trigger circuits, IC 555 Timer, Application of IC 555, Switched capacitor filter, Frequency to Voltage converters.

Course Code	BEEE3002	Course Name	Control Systems

Course Objectives

Study of Open loop & closed control; servomechanism, Transfer functions, Block diagram algebra, Signal flow graph, time response of first and second order systems, time response specifications, dynamics of linear systems, and frequency domain analysis and design techniques. Constructional and working concept of ac servomotor, synchronous and stepper motor, their characteristics, performance. The Routh-Hurwitz, root-locus, Bode, and Nyquist techniques. Design and compensation of feedback control systems. Diagonalization, Controllability and observability and their testing.

Prerequisites: Engineering Mathematics

Course Outcomes

CO1	Summarize different control system and solve transfer function, block diagram and signal flow diagram reduction of control system.
CO2	Design and solve control system engineering problems in time response of first and second order systems.Analyze concept of ac servomotor, synchronous and stepper motor and and understand Stability and Algebraic Criteria concept of stability and necessary conditions
CO3	Applying concept of ac servomotor, synchronous and stepper motor and understand Stability and Algebraic Criteria concept of stability and necessary conditions
CO4	Demonstrate & analyse frequency response analysis for stability by polar and inverse polar plots, Bode plots, Nyquist stability criterion, gain margin and phase margin
CO5	Realize the design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain, diagonalization, Controllability and observability and their testing

Text and Reference Books

1. Nagrath&Gopal, “Control System Engineering”, 4th Edition, New age International.
2. 2. K. Ogata, “Modern Control Engineering”, Prentice Hall of India.
3. 3. B.C. Kuo & FaridGolnaraghi, “Automatic Control System” Wiley IndiaLtd, 2008.
4. N.C. Jagan, “Control Systems”, B.S. Publications,2007. K. Ogata, “Modern Control Engineering”, Prentice Hall of India.
5. D.RoyChoudhary, “Modern Control Engineering”, Prentice Hall of India.

Syllabus

UNIT I

Open loop & closed control system, servomechanism, Physical examples. Transfer functions, Block diagram algebra, and Signal flow graph, Mason’s gain formula Reduction of parameter variation and effects of disturbance by using negative feedback.

UNIT II

Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants. Design specifications of second order systems: Derivative error,

derivative output, integral error and PID compensations, design considerations for higher order systems, performance indices.

UNIT III

Routh-Hurwitz criteria and limitations, root locus concepts, construction of root locus. Constructional and working of ac servomotor, synchronous and stepper motor.

UNIT IV

Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles.

UNIT V

The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain. Review of state variable technique: Review of state variable technique, conversion of state variable model to transfer function model and vice-versa, diagonalization, Controllability and observability and their testing.

Course Code	BECE2020	Course Name	Digital Signal Processing

Course Objectives

1. Introduce to discrete time signal processing and characterization of random signals, filter design techniques, and imperfections caused by finite word length.
2. Learn how design FIR and IIR filters.
3. Learn the theory of digital signal processing and digital filter design, including hands-on experience with important techniques involving digital filter design and digital simulation experiments
4. Introduce the fundamental principles and techniques of digital signal processing for understanding and designing new digital signal processing systems and for continued learning.

Prerequisites: Signals and System, Engineering Mathematics

Course Outcomes

CO1	Apply Digital Signal Processing fundamentals.
CO2	Acquire the knowledge of representation of discrete-time signals in the frequency domain,using z-transform and discrete Fourier transform
CO3	Learn the basic forms of FIR and IIR filters.
CO4	Design filters with desired frequency responses
CO5	Understand the concept of linear prediction and spectrum estimation.

TEXT BOOKS

1. Proakis J. G. and Manolakis D. G., "Digital Signal Processing: Principles, Algorithms And Applications", Pearson Education, 3rd Ed., 2003

2. Babu Ramesh P., "Digital Signal Processing", SciTech Publication, 41FL Ed., 2008.

REFERENCE BOOKS

1. Mitra Sanjit K., "Digital Signal Processing: A Computer Based Approach", 3rd Ed., Tata McGraw-Hill, 2008.

2. Oppenhein A. V. and Shafer R. W., "Discrete-Time Signal Processing", PHI, 2nd Ed., 2000.

3. Shaliwahan S., Vallavaraj A. and Gnanapriya C., "Digital Signal Processing", Tata McGraw-Hill, 2nd Ed., 200

Syllabus

UNIT I SIGNALS AND SYSTEMS

Basic elements of DSP, concepts of frequency in Analog and Digital Signals, sampling theorem, Discrete–time signals, systems, Analysis of discrete time LTI systems, Z transform, Convolution, Correlation.

UNIT II FREQUENCY TRANSFORMATIONS

Introduction to DFT, Properties of DFT, Circular, Convolution , Filtering methods based on DFT, FFT Algorithms, Decimation–in–time Algorithms, Decimation–in–frequency Algorithms, Use of FFT in Linear Filtering, DCT, Use and Application of DCT.

UNIT III IIR FILTER DESIGN

Structures of IIR, Analog filter design, Analog Low Pass Butterworth Filter, Analog Low Pass Chebyshev Filter, Comparison Between Butterworth Filter And Chebyshev Filter, Frequency Transformation In Analog Domain, Design Of High Pass, Bandpass And Bandstop Filters, Design Of IIR Filters From Analog Filters, Approximation Of Derivatives, Design Of IIR Filter Using Impulse Invariance Technique, Design Of IIR Filter Using Bilinear Transformation, Frequency Transformation In Digital Domain.

UNIT IV FIR FILTER DESIGN

Structures of FIR, Linear phase FIR filter, Frequency Response Of Linear Phase FIR Filters, Location Of The Zeros Of Linear Phase FIR Filters, The Fourier Series Method Of Designing FIR Filters, Design Of FIR Filter Using Windows, Digital Differentiator, Hilbert Transformers, Frequency Sampling Method Of Designing FIR Filters, Optimum Equi-ripple Approximation Of FIR Filters.

UNIT V INTRODUCTION TO DSP PROCESSORS

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X-Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Registrar, Index Registrar, Auxiliary Register Compare Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On- chip registers, On-chip peripherals