Shobhit DEEMED UNIVERSITY
EDUCATION EMPOWERS
A NAAC ACCREDITED UNIVERSITY

B.Tech. (Electronics and Communication Engineering)

Approved and adopted in year 2018 (Board of Studies, August 3, 2018)
by 23rd Academic council (Agenda no-03)

S.No.	Course Work-Subject Area	Credits/ Semester								Credits Total
		I	II	III	IV	V	VI	VII	VIII	
1.	Humanities and Social Sciences (HS)	4	3	3	4	-	-	-	-	14
2.	Basic Sciences(BS)	9/8	8	4	4	-	-	-	-	24
3.	Engineering Sciences (ES)	9/10	10	4	4	-	-	-	-	27
4.	Core Electronics and Communication (CEC)	-	-	15	10	18	18	16		77
5.	Department Specific Elective(DEC)	-	-	-	4	4	4	4	-	16
6.	Open Electives (OEC)	-	-	-	-	4	4	4	-	12
7.	Project Work, Seminar and/or Internship	-	-	-	-	-	-	2	15	17
	Total	22	21	26	26	26	26	26	15	188
8	Mandatory Courses(MC)(NonCredit)	-	2		2		2	2	-	8

B.Tech. 2nd Year (Electronics and Communication Engineering)

Subject Code	Subject Name	L	T	P	Cr
3rd Semester					
HSS-3--	-----	3	0	0	3.0
BSC-3--	-----	3	1	0	4.0
ESC-3--	-----	3	1	0	4.0
CEC-301	Electronic Devices & Circuits	3	1	0	4.0
CEC-302	Network Analysis & Synthesis	3	1	0	4.0
CEC-303	Digital Electronics	3	1	0	4.0
CEC-351	Electronics Circuits Lab	0	0	2	1.0
CEC-352	Digital Electronics Lab	0	0	2	1.0
CEC-353	Electronics Workshop	0	0	2	1.0
	Total	**18**	**5**	**6**	**26**

DCS*(Discipline Specific Elective)- Students are advised to select any one course form the DCS pool. This is offered by the department.

Subject Code	Subject Name	L	T	P	Cr
4th Semester					
HSS-4--	-----	3	1	0	4.0
BSC-4--	-----	3	1	0	4.0
ESC-4--	-----	3	1	0	4.0
CEC-401	Integrated Circuits	3	1	0	4.0
CEC-402	Signals & Systems	3	1	0	4.0
CEC-451	Integrated Circuits Lab.	0	0	2	1.0
CEC-452	Measurement Lab.	0	0	2	1.0
DEC*4--	Discipline Specific Elective-I	3	1	0	4.0
	Total	**18**	**5**	**6**	**26**
MC- 404	Skill development	2	0	0	NonCredit

B.Tech. 3rd Year (Electronics and Communication Engineering)

Subject Code	**Subject Name**	L	T	P	Cr
5th Semester					
CEC-501	Microprocessor: Architecture & Interfacing	3	1	0	4.0
CEC-502	Communication Systems	3	0	0	3.0
CEC-503	Control System Engineering	3	1	0	4.0
CEC-504	Electro Magnetic Field Theory	3	1	0	4.0
CEC-551	Microprocessor Interfacing & Programming Lab.	0	0	2	1.0
CEC-552	Communication System Lab.	0	0	2	1.0
CEC-553	Control System Lab	0	0	2	1.0
DEC*-5--	Discipline Specific Elective-II	3	1	0	4.0
OEC*-5--	Open Elective-I	3	1	0	4.0
	Total	**18**	**5**	**6**	**26**

Subject Code	**Subject Name**	L	T	P	Cr
6th Semester					
CEC-601	Digital Signal Processing	3	1	0	4.0
CEC-602	Microwave Engineering	3	0	0	3.0
CEC-603	VLSI Design &Technology	3	1	0	4.0
CEC-604	Digital Communication	3	1	0	4.0
CEC-651	Digital Signal Processing Lab.	0	0	2	1.0
CEC-652	Microwave Lab	0	0	2	1.0
CEC-653	VLSI & Circuit Design Lab.	0	0	2	1.0
DEC*-6--	Discipline Specific Elective-III	3	1	0	4.0
OEC.*-6--	Open Elective-II	3	1	0	4.0
	Total	**18**	**5**	**6**	**26**
MC-606	Technical Seminar	2	0	0	NonCredit

(Open Elective Course)- Students are advised to select any one course form the Open elective pool. This is offered by the other department.

B.Tech. 4th Year (Electronics and Communication Engineering)

Subject Code	**Subject Name**	L	T	P	Cr
7th Semester					
CEC-701	Satellite Communication	3	1	0	4.0
CEC-702	Antenna & Wave Propagation	3	1	0	4.0
CEC-703	Optical Fiber Communication	3	1	0	4.0
CEC-704	Wireless Communication	3	0	0	3.0
CEC-751	VHDL Lab.	0	0	2	1.0
CEC-771	Minor Project	0	0	4	2.0
DEC* 7--	Discipline Specific Elective-IV	4	0	0	4.0
OEC* -7--	Open Elective-III	3	1	0	4.0
	Total	18	5	6	26
MC-701	Foreign Language	2	0	0	Non Credits

8th Semester			
CEC-861	Industrial Training & Presentation		15.0

LISTS OF COURSES IDENTIFIED
(Electronics and Communication)

(a) Humanities and Social Science (HSS)(Pool)

S. No.	Course Code	Course Titles	Hrs/Week L : T : P	Credits	Preferred Semester
Theory					
1.	HSS 101	Communication and Soft Skills	3 : 0 : 0	3	I
2.	HSS 102	Elements of Indian History for Engineers	3 : 0 : 0	3	I
3.	HSS 203	Basics of Technical Writing	2 : 1 : 0	3	II
4.	HSS 204	Ethics and Self Awareness	3 : 0 : 0	3	II
5.	HSS 05	Law for Engineers	3 : 0 : 0	3	III
6.	HSS 06	Economics of Engineers	3 : 0 : 0	3	III
7.	HSS 07	Neuroscience	4 : 0 : 0	4	III/IV
8.	HSS 08	Business Communication and Presentation Skills	4 : 0 : 0	4	III/IV
9.	HSS 09	Management Concepts and Practices	3 : 1 : 0	4	III/IV
10.	HSS 10	Corporate Finance	4 : 0 : 0	4	IV
11.	HSS 11	Entrepreneurship	4 : 0 : 0	4	IV
12.	HSS 12	IPR and Engineering Ethics	4 : 0 : 0	4	IV
Practical					
13.	HSS 51	Communication Lab.	0 : 0 : 2	1	I

Note: First numeric value of the subject code represents semester.

(b) Basic Sciences (BSC)

S. No.	Course Code	Course Titles	Hrs/Week L : T : P	Credits	Preferred Semester
Theory					
1.	BSC 101	Engineering Mathematics	3 : 1 : 0	4	I
2.	BSC 102	Remedial Mathematics	3 : 1 : 0	4	I
3.	BSC 103/203	Engineering Physics	3 : 1 : 0	4	I/II
4.	BSC 104/204	Engineering Chemistry	4 : 0 : 0	4	I/II
5.	BSC 205	Advanced Mathematics	3 : 1 : 0	4	II
6.	BSC 206	Advanced Remedial Mathematics	3 : 1 : 0	4	II
7.	BSC 07	Discrete Mathematics	3 : 1 : 0	4	III
8.	BSC 08	Advanced Engineering Mathematics	3 : 1 : 0	4	III
9.	BSC 09	Applied Physics	3 : 0 : 0	3	III
10.	BSC 10	Analytical Methods	3 : 1 : 0	4	III
11.	BSC 11	Principles of Agronomy	4 : 0 : 0	4	III
12.	BSC 12	Biochemistry	4 : 0 : 0	4	III
13.	BSC 13	Biophysics	3 : 0 : 0	3	III/IV
14.	BSC 14	Numerical Analysis	3 : 1 : 0	4	IV
15.	BSC 15	Clinical Sciences and its Applications	3 : 1 : 0	4	IV
16.	BSC 16	Operational Research	3 : 1 : 0	4	IV

17.	BSC 17	Principles of Genetics	3 : 1 : 0	4	IV
18.	BSC 18	Animal and Plant Physiology	4 : 0 : 0	4	IV
19.	BSC 19	Mathematical Statistics	3 : 1 : 0	4	IV
Practical					
20.	BSC 51	Physics Lab.	0 : 0 : 2	1	I/II
21.	BSC 52	Agronomy Lab.	0 : 0 : 2	1	III
22.	BSC 53	Biochemistry Lab.	0 : 0 : 2	1	III

Note: First numeric value of the subject code represents semester.

(c) Engineering Sciences (ESC)

S. No.	Course Code	Course Titles	Hrs/Week L : T : P	Credits	Preferred Semester
Theory					
1.	ESC 101	Fundamentals of Electronics	3 : 1 : 0	4	I/III
2.	ESC 102	Engineering Mechanics	3 : 1 : 0	4	I
3.	ESC 103	Fundamentals of Biological Sciences	3 : 1 : 0	4	I
4.	ESC 104/204	Computer Fundamentals and Programming using 'C'	3 : 1 : 0	4	I/II
5.	ESC 105/205	Basic Electrical Engineering	3 : 1 : 0	4	I/II
6.	ESC 206	Manufacturing Practice	3 : 0 : 0	3	II
7.	ESC 207	Introduction to Bio-engineering	3 : 0 : 0	3	II
8.	ESC 08	Electrical and Electronics Materials	3 : 1 : 0	4	III
9.	ESC 09	Electrical Engineering Material	3 : 0 : 0	3	III

		Science			
10.	ESC 10	Engineering Thermodynamics	3 : 1 : 0	4	III
11.	ESC 11	Networks and Systems	3 : 1 : 0	4	III
12.	ESC 12	Data structure using 'C'	3 : 1 : 0	4	III
13.	ESC 13	Building Material Science	3 : 1 : 0	4	III
14.	ESC 14	Neural Engineering	3 : 1 : 0	4	III/IV
15.	ESC 15	Fundamentals of Nanotechnology	3 : 1 : 0	4	III/IV
16.	ESC 16	Fundamentals of Information Technology	3 : 1 : 0	4	III/IV
17.	ESC 17	Environmental Engineering	3 : 1 : 0	4	IV
18.	ESC 18	Control System	3 : 1 : 0	4	IV
19.	ESC 19	Computer Organization and Architecture	3 : 1 : 0	4	IV
20.	ESC 20	Information Theory and Coding	3 : 1 : 0	4	IV
21.	ESC 21	E- Commerce	3 : 1 : 0	4	IV
22.	ESC 22	Chemical Engineering Principles	4 : 0 : 0	4	IV
23.	ESC 23	Elements of Power System	3 : 1 : 0	4	IV
24.	ESC 24	Engineering Materials and Material Science	3 : 0 : 0	3	IV
Practicals					
25.	ESC 51	Computer Programming Using 'C' Lab.	0 : 0 : 2	1	I/II
26.	ESC 52	Engineering Drawing Lab.	0 : 1 : 2	2	I/II
27.	ESC 53	Workshop Practice	0 : 0 : 2	1	II
28.	ESC 54	Bio-instrument Workshop	0 : 0 : 2	1	II

29.	ESC 55	Networks Lab.	0 : 0 : 2	1	III
30.	ESC 56	CAD Lab.	0 : 0 : 2	1	III/IV

Note: First numeric value of the subject code represents semester.

Engineering Sciences (ESC)

S. No.	Course Code	Course Titles	Hrs/Week L : T : P	Credits	Preferred Semester
31.	ESC 101/201	Fundamentals of Electronics	3 : 1 : 0	4	I
32.	ESC 102/202	Computer Fundamentals and Programming using 'C'	3 : 1 : 0	4	I/II
33.	ESC 103/203	Computer Programming Using 'C' Lab.	0 : 0 : 2	1	I/II
34.	ESC 104/204	Basic Electrical Engineering	3 : 1 : 0	4	I/II
35.	ESC 105/205	Engineering Graphics Lab.	0 : 0 : 2	1	I/II
36.	ESC 201	Manufacturing Practice	3 : 1 : 0	4	II
37.	ESC 202	Workshop Practice	0 : 0 : 2	1	II
38.	ESC 301	Electrical and Electronics Materials	3 : 1 : 0	4	III
39.	ESC 302/402	Engineering Thermodynamics	3 : 1 : 0	4	III/IV
40.	ESC 401	Computer Organization and Architecture	3 : 1 : 0	4	IV

(d) Core Electronics &Communication (CEC)

S. No.	Course Code	Course Titles	Hrs/Week L : T : P	Credits	Preferred Semester

1.	CCS-301	Electronic Devices & Circuits	3 : 1 : 0	4	III
2.	CCS-302	Network Analysis & Synthesis	3 : 1 : 0	4	III
3.	CEC-303	Digital Electronics	3 : 1 : 0	4	III
4.	CEC-351	Electronics Circuits Lab	0 : 0 : 2	1	III
5.	CEC-352	Digital Electronics Lab	0 : 0 : 2	1	III
6.	CEC-353	Electronics Workshop	0 : 0 : 2	1	III
7.	CEC-401	Integrated Circuits	3 : 1 : 0	4	IV
8.	CEC-402	Signals & Systems	3 : 1 : 0	4	IV
9.	CEC-451	Integrated Circuits Lab.	0 : 0 : 2	1	IV
10.	CEC-452	Measurement Lab.	0 : 0 : 2	1	IV
11.	CEC-501	Microprocessor: Architecture & Interfacing	3 : 1 : 0	4	V
12.	CEC-502	Communication Systems	3 : 0 : 0	3	V
13.	CEC-503	Control System Engineering	3 : 1 : 0	4	V
14.	CEC-504	Electro Magnetic Field Theory	3 : 1 : 0	4	V
15.	CEC-551	Microprocessor Interfacing & Programming Lab.	0 : 0 : 2	1	V
16.	CEC-552	Communication System Lab.	0 : 0 : 2	1	V
17.	CEC-553	Control System Lab	0 : 0 : 2	1	V
18.	CEC-601	Digital Signal Processing	3 : 1 : 0	4	VI
19.	CEC-602	Microwave Engineering	3 : 0 : 0	4	VI
20.	CEC-603	VLSI Design Technology	3 : 1 : 0	4	VI
21.	CEC-604	Digital Communication	3 : 1 : 0	4	VI
22.	CEC-651	DSP Lab.	0 : 0 : 2	1	VI
23.	CEC-652	Microwave Lab	0 : 0 : 2	1	VI
24.	CEC-653	VLSI & Circuit Design Lab.	0 : 0 : 2	1	VI
25.	CEC-701	Satellite Communication	3 : 1 : 0	4	VII
26.	CEC-702	Antenna & Wave Propagation	3 : 1 : 0	4	VII
27.	CEC-703	Optical Fiber Communication	3 : 1 : 2	5	VII
28.	CEC-704	Wireless Communication	3 : 0 : 0	3	VII

29.	CEC-771	Minor Project	0 : 0: 4	2	VII
30.	CEC-751	VHDL Lab.	0 : 0 : 2	1	VII
31.	CEC-861	Industrial Training & Presentation	0:0:30	15	VIII

(e) Discipline Specific Electives *(DCS)*

S. No.	Dept. Elective	Course Code	Course Titles	Hrs/Week L : T : P	Credits	Preferred Semester
1	Discipline Specific Elective-I	DEC-401	Electronic Measurement & Instrumentation	3 : 1 : 0	4	IV
2		DEC-402	Nanotechnology	3 : 1 : 0	4	IV
3		DEC-403	LASER System & application	3 : 1 : 0	4	IV
4		DEC-404	Modelling and Simulation	3 : 1 : 0	4	IV
5	Discipline Specific Elective-II	DEC-501	MATLAB Programming for Engineers	3 : 1 : 0	4	V
6		DEC-502	Opto Electronics	3 : 1 : 0	4	V
7		DEC-503	Solid State Devices & Circuits	3 : 1 : 0	4	V
9	Discipline Specific Elective-III	DEC-601	Microcontroller & Embedded System	3 : 1 : 0	4	VI
10		DEC- 602	Telecommunication System	3 : 1 : 0	4	VI
11		DEC-603	Principles of secured Communication	3 : 1 : 0	4	VI
12		DEC-604	Digital Control System	3 : 1 : 0	4	VI
13	Discipline Specific Elective-IV	DEC-701	VHDL	3 : 1 : 0	4	VII
14		DEC-702	RADAR & NAVIGATIONAL AIDS	3 : 1 : 0	4	VII

15		DEC-703	Digital Image Processing	3 : 1 : 0	4	VII
16		DEC-704	IC Fabrication & Testing	3 : 1 : 0	4	VII

(f) Open ElectiveCourse*(OCS)*[*Offer to other Departments****]***

S. No.	**Open Elective**	**Course Code**	**Course Titles**	**Hrs/Week L : T : P**	**Credits**	**Preferred Semester**
1	Open Elective Course -I	OEC-501	Electronic Devices & Circuits	3 : 0 : 2	4	V
2		OEC-502	Digital Electronics	3 : 1 : 0	4	V
3		OEC-503	Electro Magnetic Field Theory	3 : 1 : 0	4	V
		OEC-504	Communication Systems	3 : 1 : 0	4	V
4		OEC-505	Microprocessor: Architecture & Interfacing	3 : 1 : 0	4	V
5	Open Elective Course -II	OEC-601	Integrated Circuits	3 : 1 : 0	4	VI
6		OEC-602	Electronic Measurement &Instrumentation	3 : 1 : 0	4	VI
7		OEC-603	Digital Signal Processing	3 : 1 : 0	4	VI
8		OEC-604	VLSI Design & Technology	3 : 1 : 0	4	VI
9		OEC-605	Microcontroller & Embedded System	3 : 1 : 0	4	VI
		OEC-606	Signals and Systems	3 :1 :0	4	VI
11	Open Elective Course –III	OEC-701	Wireless Communication	3 : 1 : 0	4	VII
10		OEC-702	Digital Image Processing	3 : 1 : 0	4	VII
11		OEC-703	MATLAB Programming for Engineers	3 : 1 : 0	4	VII
12		OEC-704	VHDL	3 : 1 : 0	4	VII
13		OEC705	Antenna & Wave Propagation	3 : 1 : 0	4	VII

(g) Mandatory Courses *(MC)*

S. No.	Course Code	Course Titles	Hrs/Week L : T : P	Credits	Preferred Semester
1.	MC-01	Environmental Studies	2 : 0 : 0	2	I/II
2.	MC-02	Human Rights	2 : 0 : 0	2	I/II
3.	MC-03	Indian Civilization	2 : 0 : 0	2	I/II
4.	MC-04	Skill development	2 : 0 : 0	2	III/IV
5.	MC-05	Personality Development & Soft Skill	2 : 0 : 0	2	III/IV
6.	MC-06	Technical Seminar	2 : 0 : 0	2	V/VI
7.	MC-07	Knowledge Enhancement	2 : 0 : 0	2	V/VI
8.	MC-08	Report Writing	2 : 0 : 0	2	V/VI
9.	MC-09	Foreign Language	2 : 0 : 0	2	VII
10.	MC-10	Energy Studies	2 : 0 : 0	2	VII

3rd Semester
ELECTRONIC DEVICES & CIRCUITS

CEC-301

Cr.	L	T	P
4	3	1	0

Unit-I

Bipolar Junction Transistors: Transistor amplifier, small signal Equivalent circuits (Hybrid-pi, Ebers moll), Graphical Analysis, biasing the BJT for discrete-circuit design, Basic Single Stage BJT amplifier and Multistage Transistor Amplifiers configurations, Transistor Audio Power Amplifiers. Working of a Transistor as a switch cut off & saturation, complete static characteristics, internal capacitances and second order effects, Emitter Follower.

Unit-II

MOSFETS: Construction of Enhancement and Depletion mode MOSFET, Working Principle of MOSFET, MOSFET Types, Drain & Transfer characteristics, internal capacitances of MOSFET, MOSFET as an amplifier, Operating Regions of MOSFET, Ohmic Region, Cut-Off Region, Saturation Region . MOSFET applications Biasing in MOS amplifier circuits, Basic configurations of MOS amplifier, Analysis of Source follower.

Unit-III

Frequency Response: Working principle and Circuit Topology of Low and high frequency response of common source and common emitter amplifiers, common base & common gate cascade configurations, Frequency response of source followers, Cascade & Cascode amplifier, and Darlington connection, significance.

Unit-IV

Feed Back & Oscillators: Types of feedback, Effect of feedback on noise, distortion, gain, input and output impedance of the amplifiers, analysis of Voltage and Current feedback amplifiers. Properties of negative feedback, four basic feedback topologies (series shunt; series-series; shunt-shunt; & shunt-series) determination of Loop gain, Basic principles of sinusoidal oscillator Different oscillator circuits (RC phase shift, Wein-bridge, Collpitts, Hartley, Clap. and Crystal Oscillators.)

Unit-V

Special Purpose Diodes: Working principle**,** constructions and characteristics of LED, Varactor, Photodiode, Schottkey barrier, Tunnel diode, Gun diode (constructions and characteristics), Basic principle of LASER action.

Reference Books:

1. A.S. Sedra and K.C. Smith, "Microelectronic circuits", Oxford University Press (India).
2. Boylestad&Nashelsky "Electronic Device and Circuit."
3. Millman, J. and Grabel, A./"Microelectronics"/McGraw Hill.
4. Bell, David A/ "Electronic Devices & Circuits"/Prentice Hall (India) 4th Edition.

NETWORK ANALYSIS AND SYNTHESIS

CEC-302

	Cr.	L	T	P
	4	3	1	0

Unit-I

Graph Theory: Graph of a Network, Definitions: Planar graphs –Mesh analysis, Tree, co-tree, link, basic loop &basic cut set, Fundamental cut set matrix, Incidence matrix, Relation between circuit, cut set and incidence matrices, Cut set matrix, Tie-set matrix, Duality, Loop & Node methods of analysis (using branch matrix)

Unit-II

Network Theorems: Superposition Theorem, limitation of Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer theorem, Maximum power, Millman's Theorem, Reciprocity Theorem, Tellegen' Theorem, Compensation Theorem limitation of Compensation Theorem .

Laplace Transform: Definition and Properties of Laplace Transform, Change of scale property. Laplace transforms of some common functions, Step function, Impulse function, Inverse Transform, Initial and Final value theorems, Tuned Circuits. Applications of Laplace Transform

Unit-III

Network Functions: Concept of complex frequency, Network functions of one port & two port network, Concept of poles & zeros, Restriction on Pole and Zero locations of network function, Properties of driving point & transfer functions, Time response from pole-zero plot, Stability from pole-zero plots (Routh Criteria)

Unit-IV

Two Port Network: Characterization of LTI two port networks: - Z-Parameters, Y-Parameters, hybrid-Parameters, transmission-Parameter, Inter-relationships between the parameters, Inter-connections of two port networks

Unit-V

Network Synthesis: Hurwitz Polynomials, Positive Real Functions**,** Definition & properties of LC, RC, RL, Driving point immittance function using Foster &Cauer form of LC, RC, and RL Networks. An Introduction to Spice

Reference Book:

1. Networks & systems/ D. Roy Choudhary/ New age publishers. /2003 edition
2. Circuits & Networks / A SudhakarShyammohan S. Pali / Tata McGraw-Hill publication /3rd edition
3. Network Analysis & Synthesis/A. Chakravorty/ Khanna Publishers/ 2005 edition
4. Smarjit Ghosh, "Network Theory : Analysis and Synthesis" PHI.

DIGITAL ELECTRONICS

CEC-303

Cr.	L	T	P
4	3	1	0

Unit-I

Introduction: Types of Digital circuits and their characteristics, Number system: Direct conversion between bases, Negative numbers & BCD and their arithmetic's, Boolean algebra, Logic gates, Minimization of Boolean Functions: K-Map & Tabular method up to 6 variables, Error detecting & correcting codes, hamming codes.

Unit-II

Combinational Logic Circuits: Design Procedure, Adders, Subtractors, Code conversion, Multiplexers/ Demultiplexers, Encoder/ decoders, decimal adders & amplitude comparators. Decoder and driver circuits for 7-segment LED displays, D/A converter.

Unit-III

Sequential Logic Circuits: Flip–Flops and their conversions, excitation table, state table & state diagram, Shift registers and their applications. Design of synchronous and asynchronous counters, Analysis Procedure of synchronous & asynchronous sequential circuits, Reduction of state & flow table, Race free state assignment.

Unit-IV

Logic Families- RTL, DTL, TTL, ECL and CMOS

Memory & Programmable Logic- RAM, ROM, PLA, PAL

Unit-V

DACs and ADCs:D/A Converter – General considerations, Static non-idealities and Dynamic non-idealities; Current-steering DAC – Binary weighted DAC, Design issues, Effect of Mismatches. A/D converter – General considerations, static and dynamic non-idealities; Flash ADC, Successive Approximation ADC

Reference Books :

1. Digital Design by M Moris Mano, 2nd Edn.PHI
2. Introduction to Digital Microelectronic Circuits, by Gopalan, TMH.
3. Switching Circuit & Logic Design by Hill & Peterson, Wiley
4. Digital Circuit & Logic Design, by Holsworth.

ELECTRONIC CIRCUITS LAB.

CEC-351 **Cr. L T P**
1 0 0 2

LIST OF EXPERIMENTS:

1. To design a potential divider biasing circuit for the given values of V_{CE}, I_E, V_{CC}, and Beta.
2. To design a single stage RC coupled BJT amplifier & determine the voltage gain & maximum signal handling capacity of this amplifier.
3. To plot the frequency response of a single stage RC coupled FET amplifier & determine the bandwidth of it.
4. To design an emitter follower circuit using Darlington pair of transistors and find the voltage gain and I/P impedance of it.
5. To determine the efficiency of a class AB/B push-pull amplifier.
6. To design a Full adder & Full subtractor circuits using basic logic gates only and also to verify the truth table.
7. To design a SR& JK flip Flop using NAND gate & verify the truth table.
8. To design a MOD-10 counter using programmable counter & verify the truth table.
9. To design a Serial-in serial-out &Serial-in parallel-out Shift Register using D Flip Flop & verify the truth table.
10. To design a BCD to 7 Segment Display.

DIGITAL ELECTRONICS LAB.

CEC-352 **Cr. L T P**
1 0 0 2

LIST OF EXPERIMENTS:

1. Combinational Logic design using basic gates (Code Converters, Comparators).
2. Combinational Logic design using decoders and MUXs.
3. Arithmetic circuits - Half and full adders and subtractors.
4. Arithmetic circuits – design using adder ICs, BCD adder.
5. Flip flop circuit (RS latch, JK & master slave) using basic gates.
6. Asynchronous Counters.
7. Synchronous counters, Johnson& Ring counters
8. Sequential Circuit designs (sequence detector circuit).
9. Transfer Characteristics , Measurement of Sinking and Sourcing currents etc. of TTL gates

ELECTRONICS WORKSHOP

CEC-353 **Cr. L T P**
1 0 0 2

LIST OF EXPERIMENTS:

1. The various types of resistances and Find out the values from color bandson/written values
2. Identify the various types of Capacitances and Find out the values using ColorCode/written values on them.
3. Identify the terminals of a Diode and its Polarity.
4. Identify the terminals of a Transistor and its Type (n-p-n or p-n-p)
5. Check the continuity of a printed line on a PCB using Multi-meter.
6. Identify the various type of connector used in various Gadgets &Instruments/Equipments
7. Solder the joint connection of wires and check it. De-solder it and Re-solder.
8. Identify the various tools & write down their uses
9. Identify the various types of Copper-Clads and write down their application
10. Identify the type of Components and find out the values using LCR-Meter.

4th Semester

INTEGRATED CIRCUITS

CEC-401 **Cr. L T P**
4 3 1 0

Unit-I

IC OP-AMP applications: OP-AMP Fundamentals (brief review of Differential amplifier, current mirror, active load, level shifter, output stage, ac and dc characteristics), Block diagram representation of a typical Op-amp, ideal voltage transfer curve, inverting/non-inverting VCVS, integrator, differentiator, CCVS and VCCS, instrumentation amplifier.

Unit-II

Waveform Generator: 555Timer, Astable Mode, Monostable Mode, Bistable Mode, crystal controlled Oscillator, Triangular waveform generator, Saw tooth generator, PLL Fundamentals, and PLL synthesizer.

Unit-III

Active Filters: Active versus passive filters**,** types of Active Filters, The Biquadratic Function, First order low pass and high pass active filter, Second order low pass and high pass filters, Higher order filters, Band pass filter, Single op-amp band pass filter, Multistage band pass filter, Notch filter, Filter Design Guide Lines.

Unit-IV

Non-linear Circuits: Peak detector, working of Peak detector, types of Peak detector, sample and hold Circuit, Significance. Op-amp as a comparator, Schmitt trigger, Monostable Multivibrator, Astable Multivibrator.

Unit-V

Voltage Regulator: Introduction to voltage regulator, Types of voltage regulators, Op-amp regulators, IC regulators, Fixed voltage regulators (78/79, XX), Switched Mode Power supply, switching losses, Comparison between Linear regulator and Switching regulator.

Reference Books:

1. OP-Amps & linear integrated circuits by Ramakant A Gayakwad, 121, B.B.
2. Introduction to Digital Microelectronic Circuits, by Gopalan, TMH
3. Digital Circuit & Logic Design, by Holsworth.
4. Sedra and Smith, Microelectronic Circuits", Oxford University press, 5th Edition,
5. Digital Circuits and Logic Design, S. Lee, PHI.

SIGNALS AND SYSTEMS

EC-402 **CrLTP**

4 310

UNIT-I

Introduction to Signals and Systems **8**

Continuous-time and discrete-time signals and their classification; Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids Transformations of the independent variable; Continuous-time and discrete-time LTI Systems, classification and properties of continuous-time and discrete- time LTI Systems.

UNIT-II

Fourier series and Fourier Transform **10**

Trigonometric and exponential form of Fourier series and their relationship; Continuous time, discrete time Fourier transforms and their properties; Representation of periodic signals in frequency domain. Fourier series for periodic signals, Fourier Transform, properties.

UNIT-III

Laplace Transform and Sampling **10**

Laplace Transform, Properties of Laplace Transform, Region of convergence, inverse Laplace Transform; Convolution Integrals, Analysis and characterization of LTI System, block

diagram representation; Unilateral Laplace transform, properties of Unilateral Laplace transform. Need for Sample and Hold Circuits, Applications of Sample and Hold Circuit ,Sampling theorem for base band and pass band signals; Signal representation by samples; Impulse train sampling, Natural sampling and flattop sampling; Reconstruction of signals from sampled version; Discrete time processing of continuous time signals.

UNIT-IV

Application of Fourier analysis

Magnitude and Phase Representation of continuous time Fourier transform and discrete time Fourier transform; Time domain properties of ideal frequency selective filter; First order, second order continuous time and discrete time systems; Convolution sum and convolution integrals; LTI System described by differential and difference equation.

UNIT-V

Z-Transform

Difference equations, basic definition, Z-transform, properties of Z-transform, region of convergence, inverse Z-transform; Analysis and characterization of LTI system, Block diagram representation; Unilateral Z-transform. Damping and shifting rules, initial value and final value theorems.

Reference Books

1. V. Oppenheim,A.S.Willsky and S. Hamid Nawab,"*Signals & Systems*", Pearson Education, SecondEdition,2008.
2. J.G.Proakis,&D.G.Manolakis,"*Digital SignalProcessing:PrinciplesAlgorithms and Applications*",Prentice Hall, Fourth Edition,2009.
3. A.V. Oppenheim&Ronald W.Schafer,"*Digital SignalProcessing*", PearsonEducation,First Edition,2002.
4. H P HSU ,Schaum's Outlines "*Signals& Systems*", Tata McGraw-Hill,2009.

Integrated Circuits Lab.

CEC-451 **Cr. L T P**

1 0 0 2

1. Transfer Characteristics of TTL inverter and TTL Schmitt trigger inverter.
2. Study of Multiplexer using IC-74151
3. Demultiplexer/ Decoder operation using IC-74138.
4. Transfer characteristics of CMOS inverters of 74C series and CD40 series and estimation of gate delay of CD40 series CMOS inverter.
5. Study of power consumption of TTL and CMOS gates under steady state and switching condition.
6. Determination of frequency response of Op-Amp.
7. Study of instrumentation amplifier.
8. Study of open loop operation of Op-amp –Comparator- Schmitt Trigger.
9. Astable&monostable operation Using timer 555 IC.

10. Testing of a Phase Locked Loop (PLL), locking and capture ranges.
11. Second order active filter- high pass & low pass realization.

MEASUREMENT LAB.

CEC-452 **Cr L T P**

1 0 0 2

LIST OF EXPERIMENTS:

1. To study AC & DC Position control
2. To determine the characteristics of P, PI, PD & PID controller.
3. To study PID based temperature controller.
4. To determine the transient response of a second order system with step square input
5. To design, implement and study the effects of different cascade compensation network for a given system.
6. To study the performance characteristic of an angular position error detector using two potentiometers.
7. Characteristics of LVDT & Strain gauge.
8. Characteristics of Thermister& RTD
9. Measurement of self- resistance by – Maxwell and AndersonBridge.
10. Measurement of capacitance by de-sauty and ScheringBridge.

Electronic Measurement & Instrumentation

DEC-401

Cr. L T P
4 3 1 0

UNIT-I8

Dimensions and Standards

Scientific notations, metric prefixes; SI electrical units; SI temperature scales; Other unit systems; Dimensionand standards.

Measurement Errors

Gross error, systematic error, absolute error andrelative error ; Accuracy, precision, resolution and significant figures; Measurement error combination, basics of statistical analysis; PMMC instrument, galvanometer; DC ammeter; DC voltmeter; Seriesohm meter,

UNIT-II8

Transistor voltmeter circuits; AC electronic voltmeter, currentmeasurement with electronic instruments, multimeter probes; Digital voltmeter systems; Digital multimeters; Digital frequency metersystem

UNIT-III8

Voltmeter and ammeter methods; Wheatstone bridge; Low resistancemeasurements, low resistance measuring instruments ; AC bridge theory; Capacitance bridges; Inductance bridges; Q meter

UNIT-IV **8**

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CRT, wave form display, time base; Dual trace oscilloscope,measurement of voltage, frequency and phase by CRO, oscilloscopeprobes, oscilloscope specifications and performance.Delay time based Oscilloscopes; Sampling Oscilloscope; DSO; DSOapplications.

UNIT-V **8**

Instrument calibration:

Comparison method; Digital multimeters as standard instrument; Calibration instrument.

Recorders: X-Y recorders; Plotters

Reference Books

1. David A. Bell, "*Electronic Instrumentation and Measurements*", PHI,Second Edition , Reprint 2008.
2. Oliver and Cage, "*Electronic Measurements and Instrumentation*", Tata M McGraw-Hill, Reprint 2009.
3. Alan S. Morris, "*Measurement and Instrumentation Principles*", Elsevier (Buterworth Heinmann), Reprint 2008

Nanotechnology

DEC-402

Cr.	L	T	P
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UNIT -1 :

Introduction: Difinition of Nano-Science and Nano Technology, Applications of Nano Technology.Introduction to Physics of Solid State:Structure: Size dependence of properties; crystal structures, face centered cubicnanoparticles; Tetrehedrally bounded semiconductor structures; lattice vibrations.Energy Bands: Insulators, semiconductor and conductors; Reciprocal space; Energybands and gaps of semiconductors; effective masses; Fermi Surfaces. Localized Particles: Acceptors and deep taps; mobility; Excitons.

UNIT-2

Quantum Theory For Nano Science: Time dependent and time independent Schrodinger wave equations.Particle in a box, Potential step: Refelection and tunneling(Quantum leak). Penetration ofBarrier, Potential box(Trapped particle in 3D:Nanodot), Electron trapped in 2D plane(Nano sheet), Quantum confinerment effect in nano materials.

Properties of Individual Nano particles

Metal Nano clusters: Magic Numbers; Theoretical Modelling of Nanopraticles: geometric structure; electronic structure; Reactivity; Fluctuations Magnetic Clusters;Bulle to Nano structure.Semi conducting Nanoparticles: Optical Properties; Photofragmentation; Coulmbic explosion.

UNIT-3

Growth Techniques of Nanomaterials:Lithograpahic and Nonlithograpahic techniques, Sputtering and film deposition in glowdischarge, DC sputtering technique(p-CuAlO2 deposition). Thermal evaporationtechnique, E-beam evaporation, Chemical Vapour deposition(CVD), Synthesis of carbonnano-fibres and multi-walled carbon nanotubes, Pulsed Laser Deposition, Molecularbeam Epitoxy, Sol-Gel Techniuqe (No chemistry required), Synthesis of nanowires/rods,Electrodeposition, Chemical bath deposition, Ion beam deposition system, Vapor-Liquid–Solid (VLS) method of nanowires.

UNIT -4

Methods of Measuring Properties:Structure: Crystallography, particle size determination, surface structure,Microscopy: Scanning Prob Microscopy (SPM), Atomic Force Microscopy (AFM), FieldIon Microscopy, Scanning Electron Microscopy, Transmission Elecrtron Microscopy(TEM)Spectroscopy: Infra red and Raman Spectroscopy, X-ray Spectroscopy, Magneticresonance, Optical and Vibrational Spectroscopy, Luninscence.

UNIT-5

Buckey Ball:Nano structuresof carbon(fullerene):Carbon nano-tubes: Fabrication , structure. electrical, mechanical, and vibrationalproperties and applications.Nano diamond, Boron Nitride Nano-tubes, single elecron transistors, Moelcular machine,Nano-Biometrics, Nano Robots. 7

Text/Reference Books:

1. C.P.Poole Jr F.J. Owens, “Introduction to Nanotechnology”.
2. “Introduction to S.S. Physics” - (7
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Edn.) Wiley 1996.
3. S. Sugano & H. Koizuoni, “Microcluster Physics” –Springor 1998
4. “Handboole of Nanostructured Materials & Nanotechnology” vol.-5. Academic Press 2000
5. A.K.Bandyopadhyay, “Nano Materials” New Age International.

LASER System & application

DEC-403

Cr.	L	T	P
4	3	1	0

UNIT-I & II

Introduction:Review of elementary quantum physics, Schrodinger equation, concept of coherence,absorption, spontaneous emission and stimulated emission processes, relation betweenEinstein's A and B coefficients, population inversion, pumping, gain, optical cavities.

UNIT-III & IV

Lasers & Laser Systems: Main components of Laser, principle of Laser action, introduction to general lasers andtheir types. Three & four level Lasers, CW & Pulsed Lasers, atomic, ionic, molecular,excimer, liquid and solid state Lasers and systems, short pulse generation andMeasurement.

UNIT-V

Applications: Laser applications in medicine and surgery, materials processing, optical communication,metrology and LIDAR and holography.

Text/ Reference Books:

1. K.R. Nambiar, "Laser Principles, Types and Application" New Age International.
2. S. A. Ahmad, "Laser concepts and Applications" New Age International.

Modeling and Simulation

DEC-404

Cr.	L	T	P
4	3	1	0

UNIT – I Introduction to PLDs & FPGAs

ROMs, Logic array (PLA), Programmable array logic, GAL, bipolar PLA, NMOS PLA, PAL 14L4, Xilinx logic cell array (LCA) – I/O Block – Programmable interconnect – Xilinx – 3000 series and 4000 series FPGAs. Altera CPLDs, altera FLEX 10K series PLDs.

UNIT – II Placement and routing

Mincut based placement – iterative improvement placement– Routing: Segmented channel routing – Maze routing – Routability and routing resources – Net delays.

UNIT – III Introduction to VHDL

Digital system design process – Hardware simulation – Levels of abstraction – VHDL requirements – Elements of VHDL – Top down design VHDL operators – Timing – Concurrency – Objects and classes – Signal assignments – Concurrent and sequential assignments.

UNIT – IV Structural, Data flow & Behavioral description of hardware in VHDL

Parts library – Wiring of primitives – Wiring of iterative networks – Modeling a test bench – Top down wiring components – Subprograms. Multiplexing and data selection – State machine descriptions – Open collector gates – Three state bussing. - Process statement – Assertion statement – Sequential wait statements – Formatted ASCII I/O operations MSI based design.

UNIT – V Introduction to Verilog HDL

Lexical conventions – Data types – System tasks and Compiler Directives- Modules and Ports- Gate Level Modeling with Examples.

References

1. P.K. Chan & S. Mourad, "Digital Design sing Field Programmable Gate Array" 1st Edition, Prentice Hall, 1994.
2. J. V. Old Field & R.C. Dorf, " Field Programmable Gate Array", John Wiley, 1995.
3. M. Bolton, " Digital System Design with Programmable Logic", Addison Wesley, 1990.
4. Thomas E. Dillinger, " VLSI Engineering", Prentice Hall, 1st Edition, 1998.
5. Douglas Perry, "VHDL", 3rd Edition, McGraw Hill 2001.
6. J. Bhasker, "VHDL", 3rd Edition, Addison Wesley, 1999.

5th Semester

MICROPROCESSORS: ARCHITECTURE & INTERFACING

CEC-501 **Cr L T P**
4 3 1 0

UNIT-I

Introduction to Microprocessors **3**

Evolution of Microprocessors; History of computers; Timing and Control Unit; Category of Memory

UNIT-II

8-bit Microprocessor (8085) **9**

Central Processing Unit, Input / Output Devices, Architecture, pin diagram, demultiplexing of address bus, Bus Organization, timing diagram, instruction set, addressing modes, interrupts, assembly language programming.

UNIT-III

16-bit Microprocessors (8086) **12**

Architecture, formation of physical address, pin diagram, Bus Interface Unit, Execution Unit, timing diagram, minimum and maximum module CPU configuration, demultiplexing & buffering, segmentation, Flag register, Memory segmentation, memory organization, bus cycle, instruction cycle, addressing modes, Interrupt, Instruction set, assembly language programming of 8086; Difference between 8085 & 8086; Difference between 8086 and 8088

UNIT-IV

Data transfer scheme **6**

Basic or simple data transfer scheme, Status check data transfer, Interrupt driven data transfer , Programmed driven data transfer scheme; Interrupt driven data transfer scheme; DMA driven data transfer scheme ;8255 (PPI); Serial Data transfer (USART 8251)

UNIT-V

Interfacing IC's **10**

8257; 8253; Display controller 8279; Programmable priority controller 8259; Types of ADC, ADC IC 0808/0809. Features of 8257 DMA Controller.

Reference Books

1. D. V. Hall, "*Microprocessors Interfacing*", Tata McGraw-Hill ,Second Edition, 2002.
2. R. S. Gaunkar,"*Microprocessor Architecture, Programming and Applications with 8085/8080*",Penram Publication, Fifth Edition,1999.
3. Y.C. Liu and G.A. Gibson, "*Microcomputer Systems: The 8086/8088 Family Architecture Programming and Design*", PHI, Second Edition,2002.

COMMUNICATION SYSTEMS

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CEC-502	**3**	**1**	**0**	**4**

Unit-I

Introduction: Communication Process, Source of Information, Communication channels, base-band and pass-band signals, representation of signal and systems, modulation process, primary communication resources, analog versus digital communications.

Amplitude Modulation: Mathematical representation of amplitude modulated wave, Current calculation, Power calculation & efficiency calculation, suppressed carrier systems(SSB, DSB& VSB),their generation & detection, Single tone & multiple tone amplitude modulation, effect of

frequency and phase errors in synchronous detection, comparison of various AM systems, AM Receivers.

Unit-II

Angle Modulation: Types of Angle Modulation, Mathematical representation of frequency modulated wave for Narrow and wide band FM, Generation & detection of frequency modulated wave, Slope Detector, Matched Slope Detector, Foster-Sealy/Ratio Detector/Phase-Locked Loops, linear and non-linear modulation, FM Receiver, phase modulation. Examples based on MATLAB.

Unit-III

Pulse Modulation: Sampling theorem and its applications, Nyquist Sampling Theorem, Shannon Sampling Theorem, Pulse amplitude modulation, Pulse width modulation, Pulse position Modulation: their modulation and demodulation types of pulse time modulation, band width required for transmission PAM signals, Issues in Digital Transmission: FDM and TDM systems, Comparison of frequency division and time division multiplexed systems, T1 Digital System. Sampling Theorem for Low Pass Signals.

Unit-IV

Pulse Code Modulation: PCM, PCM System, Basic Elements of PCM, Quantizer, Reconstruction Filter, DPCM, Delta Modulation, Adaptive Delta Modulation, Voice Coders, Line Coding and Power Spectral Density

Unit-V

Noise Performance: Different types of noise, noise calculations, equivalent noise band width, noise figures, Gain and noise gain, Phase detector gain, PLL noise, effective noise temperature, and noise figure in cascaded stages. Noise calculation in Amplitude Modulated, Angle modulated and Pulse Modulated systems. Noise in FM: Pre emphasis, de-emphasis, SNR Improvement, PLL: Analog and Digital.

Reference Books:

1. B. P. Lathi, "Modern Digital & Analog Communication Systems" Third Edition, Oxford University press.
2. Singh, R.P. &Sapre, S.D. / "Communication Systems: Analog & Digital" / Tata McGraw-Hill.
3. Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition
4. Simon Haykin, "Digital Communication Systems"

CONTROL SYSTEM ENGINEERING

CEC-503 **Cr. L T P**
3 3 0 0

Unit-I

Introduction: Open loop and closed loop control systems, feedback characteristics of control systems, Mathematical representation of physical systems Electrical, Mechanical, Block diagram algebra and signal flow graphs, Mason's gain formula.

Unit-II

Time Domain Analysis: Standard Test Signals, Time response of First, Second order systems. Error Analysis: Static and Dynamic Error Coefficients, Effect of adding poles and zeroes to the system, response of P, PI, and PID controllers.

Unit-III

Concept of Stability: Concept of stability, Routh Hurwitz Criterion, Root Locus technique (Concept and construction) Frequency Response Analysis: Correlation between time and frequency response, polar and inverse polar plots, Nyquist stability criterion, Bode plots, All pass and minimum phase systems.

Unit-IV

Design through Compensation Techniques: Realization of lag, lead and lag-lead compensators, Design of closed loop control system using root locus and Bode plot Compensation.

Unit-V

Stable Variable Analysis: Introduction, State space representation, State modes of linear systems, State equations, transfer matrices, diagonalization solution of state equations, controllability and observability

Reference Books:

1. B C Kuo, Automatic Control Systems; PHI
2. K. Ogata, Automatic Control System, Pearson Education
3. I. J. Nagrath& M Gopal, Control System Engineering; New Age International publishers

ELECTRO MAGNETIC FIELD THEORY

CEC- 504 **Cr. L T P**
4 3 1 0

Unit-I

Review of Vector analysis, Rectangular, Cylindrical and Spherical coordinates and their transformation. Divergence, gradient and curl in different coordinate systems. Electric field intensity, Electric Flux density, Energy and potential.

Unit-II
Current and conductors, Dielectrics and capacitance, Poisson's and Laplace's equation.

Unit-III
Steady magnetic field, magnetic forces, materials and inductance, Time varying field and Maxwell's equation.

Unit-IV
Uniform plane waves: wave propagation in free space, dielectrics, and conductors. Poynting Vector, Plane wave reflection and dispersion.

Unit-V
Transmission lines: Line equations, line parameters and line examples. Waveguide: Basic waveguide operation, Rectangular and Dielectric waveguides.

Reference Books:

1. William H.Hayt, John A.Buck, 'Engineering Electromagnetics', Tata McGraw Hill Publishing Co. Ltd., New Delhi Sixth edition.

2. Jordan E.C. and Balmain K.G. "Electromagnetic wave and radiating systems",PHI, Second edition.
3. Krans, F, 'Electromagnetics',Tata McGraw Hill ,Fifth edition.
4. Mathew M.O.Sadiku, "Element of Electromagnetics", Oxford Press, 4th Edition.

MICROPROCESSOR INTERFACING & PROGRAMMING LAB.

CEC-551 **CrLTP**
1 00 1

LIST OF EXPERIMENTS:

1. Introduction to 8085 Microprocessor
2. Addition of 2-8 bit numbers
3. Subtraction of 2-8 bit numbers
4. Addition of 2-8 bit numbers
5. Addition of 2-16 bit numbers
6. Subtraction of 2-16 bit numbers
7. Multiplication of 2-8 bit numbers
8. Ascending Order
9. Descending Order
10. SUM of Datas

COMMUNICATION SYSTEM LAB.

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LIST OF EXPERIMENTS:

1. To generate amplitude modulated wave and determine the percentage modulation.

To Demodulate the modulated wave using envelope detector.

2. To generate AM-Double Side Band Suppressed Carrier (DSB-SC) signal.

3. To generate the SSB modulated wave.

4. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal.

To demodulate a Frequency Modulated signal using FM detector.

5. (a) To observe the effects of pre-emphasis on given input signal.

(b) To observe the effects of De-emphasis on given input signal.

6. To verify the Sampling Theorem.

7. To study phase lock loop and its capture range, lock range and free running VCO.

8. To generate the pulse amplitude modulated (PAM) and demodulated signals.

9. To generate the pulse width modulated (PWM) and demodulated signals.

10. To generate pulse position modulation (PPM) and demodulation signals and to study the effect of amplitude of the modulating signal on output.

Control System Lab.

CEC-553 **Cr. L T P**
1 0 0 2

1. To study synchronous transmitter and receiver.
2. To study AC position control.
3. To study DC position control.
4. To study stepper motor with microprocessor.
5. To study stepper motor without microprocessor.
6. To study transient response of 2^{nd} order.
7. To study potentiometric error control.
8. To study temperature controller.
9. To study PID controller.
10. To study compensation design.
11. To study close loop and open loop universal motor.
12. To study single phase induction motor.

MATLAB Programming for Engineers

DEC-501

Cr. L T P
4 3 1 0

UNIT-I
Introduction to MATLAB

The MATLAB Environment, Variables and Arrays, Initializing Variables in MATLAB, Displaying Output Data, Built-in- MATLAB Functions, Introduction to Plotting.

UNIT -II

Branching systems and Program Design

The Logical Data Type, branches, Additional Plotting Features, while Loop, for Loop, Logical Arrays and Vectorization,

UNIT- III

User-Defined Functions

Introduction to MATLAB Functions, Variable passing in MATLAB: The Pass-By-Value Scheme, Sharing Data Using Global Memory, Preserving Data between Call to a Function, Function Functions, Sub functions, Private Functions, and Nested Functions, Complex Data, String Function, Additional two-Dimentional Plots, Three-dimentional plots.

UNIT- IV

Arrays and input/output Functions

Sparse Arrays, cell Arrays, Structure Arrays, Function Handles, The textread function, More about the load and save Command, An Introduction to MATLAB File Processing, file Opening and Closing, Binary I/O Functions, Formatted I/o Functions, Comparing Formatted and Binary I/O Functions, File Positioning and Status Functions.

UNIT -V

Graphical User Interface:

The MATLAB Graphics system, Object Handles, Examination and Changing Object Properties, Using set to List Possible Property Values, User-Defined Data, finding objects, Selecting Objects with the mouse, Creating and Displaying GUI Components, Objects Properties, Panels and Buttons Groups, Dialog Boxes, Tips for Creating Efficient GUIs.

Reference Books

1. Stephen J. Chapman, "*MATLAB Programming for Engineers*", Cengage Learning, Third Edition,2008.
2. Amis Gilat, "*MATLAB: An introduction with Application*", John Wiley, Reprint 2007.

Opto Electronics

DEC-502

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Unit-I

Optical fiber: Wavetheory for optical propagation,mode volume,singlemodefibers, cutoffwavelength,modefielddiameter,effectiverefractiveindexandgroupandmode delay factor forsingle mode fiber. Step index fiber, graded index fiber, cutoff wavelength, multimode step index fiber, multimode graded index fiber.

Unit-II

Optical fiber waveguide: Structureofopticalwaveguide,light propagationinopticalfiberusingraytheory,Ray theory transmission, total internal reflection, acceptance angle, numerical aperture, electromagnetic mode theory for optical propagation, electromagnetic wave, phase and group velocity.

Unit-III

Transmission losses: Transmissioncharacteristicsofopticalfiber, attenuation, material absorption losses in silica glass fiber, intrinsic absorption, extrinsic absorption, linear scattering losses, Rayleigh scattering, Mie scattering, nonlinear scattering, stimulated Brillouin scattering, stimulated Raman scattering and fiber bend loss.

Unit-IV

Transmission dispersion: Dispersionandpulsebroadening,intra-modalandintermodal dispersionforstepandgradedindexfiber,modalnoise,overallfiberdispersionformultimodeandmonomodefiber, dispersionshifted fiber,modal birefringenceand polarizationmaintaining fiber.

Unit-V

Optical sources and detectors: LED structures- planar LED, dome LED, surface emitter LEDs, edge emitter LEDs, super luminescent LEDs. LED characteristics-optical output power, output spectrum, modulation bandwidth. Injection laser structures-gain guided laser, index guided laser, quantum well laser. Semiconductor injection laser efficiency, optical detection principle, quantum efficiency, responsivity, Pin photodiode, avalanche photodiode.

Reference books:

1. JohnM.SSenior , “Optical fiber Communication” ,PHI.

2.J.M Senior , “Optical Communication”,ThirdEdition.

3. G.E.Keiser, “Optical fiber Communication”, McGraw-Hill.

4.Wilson&Hawkes , “Optoelectronics”, PHI.

Solid State Devices & Circuits

DEC-503

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UNIT - 1 : CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS

Semiconductor materials- Periodic Structures- Crystal Lattices- Cubic lattices -Planes and Directions-The Diamond lattice- Bulk Crystal Growth-Starting Materials-Growth of Single Crystal lngots-Wafers-Doping- Epitaxial Growth -Lattice Matching in Epitaxial Growth -Vapor - Phase Epitaxy-Atoms and Electrons-Introduction to Physical Models-Experimental Observations-The Photoelectric Effect-Atomic spectra-The Bohr model- Quantum Mechanics - Probability and the Uncertainty Principle-The Schrodinger Wave Equation -Potential Well Equation -Potential well Problem-Tunneling.

UNIT – 2
ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS

Bonding Forces and Energy bands in Solids-Bonding Forces in Solids-Energy Bands-Metals, Semiconductors, and Insulators - Direct and Indirect Semiconductors -Variation of Energy Bands with Alloy Composition-Charge Carriers in Semiconductors-Electrons and Holes-Effective Mass-Intrinsic Material-Extrinsic Material - Electrons and Holes in Quantum Wells-Carrier Concentrations-The Fermi Level-Electron and Hole Concentrations at Equilibrium-Temperature Dependence of Carrier Concentrations-Compensation and Space Charge Neutrality-Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility-Drift and Resistance -Effects of Temperature and Doping on Mobility.

UNIT – 3
JUNCTIONS :Fabrication of P-N Junctions-Thermal Oxidation-Diffusion -Rapid Thermal Processing-Ion Implantation-Chemical Vapor Deposition Photolithography-Etching - Metallization-Equilibrium Conditions-The Contact Potential-Equilibrium Fermi Levels -Space Charge at a Junction-Forward -and Reverse -Biased Junctions; -Steady state conditions-Qualitative Description Of current flow at a junction-Carrier Injection-Reverse Bias-Reverse - Bias Breakdown-Zener Breakdown -Avalanche Breakdown-Rectifiers-The Breakdown Diode-Transient and AC Conditions

UNIT - 4

THE METAL -SEMICONDUCTOR-FET: The GaAS MESFET-The High Electron Mobility Transistor -Short channel Effects-The Metal Insulator Semiconductor FET-Basic Operation and Fabrication -THE ideal MOS Capacitor-Effects of Real Surfaces-Threshold Voltage -MOS capacitance Measurements- current -Voltage Characteristics of MOS Gate Oxides -The MOS Field -Effect Transistor -Output characteristics-Transfer characteristics- Mobility Models-Short channel MOSFET I-V characteristics -Control of Threshold Voltage -Substrate Bias Effects-Sub threshold characteristics

UNIT - 5 : OPTOELCTRONIC DEVICES

Photodiodes-Current and Voltage in illuminated Junction-Solar Cells-Photo detectors-Noise and Bandwidth of Photo detectors-Light-Emitting Diodes-Light Emitting Materials-Fiber Optic Communications Multilayer Heterojunctions for LEDs- Lasers-Semiconductor lasers-Population Inversion at a Junction Emission Spectra for p-n junction-The Basic Semiconductor lasers-Materials for Semiconductor lasers-Integrated Circuits -Background -Advantages of Integration -

TEXT BOOK

1. Ben.G.Streetman & Sanjan Banerjee Solid State Electronic Devices (5th Edition) PHI Private Ltd, 2003

REFERENCES

1. Yannis Tsividis: Operation & Mode line of The MOS Transistor (2nd Edition) Oxford University Press, 1999
2. Nandita Das Gupta &Aamitava Das Gupta- Semiconductor Devices Modeling a Technology, PHI, 2004.

6th Semester

DIGITAL SIGNAL PROCESSING

CEC-601 **Cr L T P**
4 3 1 0

UNIT-I

Discrete Fourier Transform **10**

The Discrete Fourier Transform frequency-domain sampling and reconstruction of discrete-Time Signals;Discrete Fourier Transform (DFT); The DFT as a linear transformation; Relationship of the DFT to Other transforms; Properties of the DFT, periodicity, linearity, and symmetry properties; Multiplication of two DFTs and circular convolution; Additional DFT properties.

UNIT-II

Efficient Computation of DFT **10**

Efficient computation of the DFT: FFT algorithms; Direct computation of the DFT; Radix-2 FFT algorithms; Efficient computation of the DFT of two real sequences computations; Efficient computation of the DFT of a 2N point real sequences; Gortezel algorithm; Chirp Z-transform algorithm.

UNIT-III

Realization of Filter Structures **8**

IIR Filter Structure

Direct forms (I & II), cascade and parallel realizations, signal flow graph, transposed structure, **FIR Filter Structures**- Direct form structure, frequency sampling structure, lattice structure, Linear phase FIR structure .

UNIT-IV

Design of FIR Filter **8**

Symmetric and anti-symmetric FIR Filters; Design of linear-phase FIR Filters using windows; Design of linear-phase FIR filters by the frequency sampling method;Equiripple filter designDifferentiators. Design of Hilbert transformers.

UNIT -V

Design of IIR Filters from Analog Filters **8**

IIR filter design by approximation of derivatives; IIR filter design by impulse invariance; IIR filter design by the Bilineartransformation; Matched-z transformation; Characteristics of commonly used analog filters; Application of above technique to the design of Butterworth and Chebyshev filters.

Reference Books

1. J.G. Proakis, &D.G.Manolakis, , "*Digital Signal Processing: Principles Algorithms and Applications*", Prentice Hall ,Fourth Edition, 2009.
2. Sanjit K. Mitra, "*Digital Signal Processing*", Tata McGraw-Hill,Third Edition,2008.
3. Oppenheim A.V. & Schafer, Ronald W., "*Digital Signal Processing*", Pearson Education,First Edition, 2002.

L.R. Rabiner, B.Gold, "*Theory and applications of DSP*", PHI,Seventh Edition ,2003.

MICROWAVE ENGINEERING

CEC-602 **Cr L T P**
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UNIT-I **8**

The propagation of EM Waves through wave guide

Rectangular waveguide; Solution of wave equation in rectangular co-ordinates; cutoff wavenumber, Derivation of field equations for TE& TM modes; Degenerate and dominant mode; Power transmission and power loss; Excitation of waveguides, non existence of TEM mode in wave guides; Introduction to circular waveguides; Strip line and micro strip line. Q-factor, Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies.

UNIT-II **9**

Cavity resonators

Rectangular and cylindrical cavities, Excitation of Cavities; Microwave components, wave guide couplings, bends and twists, transitions, directional couplers, hybrid couplers, Matched load, attenuators and phase shifters, E-plane, H-planeand hybrid Teas, hybrid ring, waveguide discontinuities, irises, Waveguide Irises, Inductive Iris, Capacitive Iris, windows and tuning screws, detectors, isolators, circulators and tunable detector; Slotted line carriage; VSWR meter; Scattering matrix and their properties, Transmission matrix.

UNIT-III **7**

Microwave Measurements

Measurement of frequency, wave length, VSWR, Physical Meaning of VSWR, VSWR Specs for Antennas, VSWR specs and the VSWR Curves, impedance, attenuation, low and high power.

UNIT-IV **8**

Microwave Tubes and Circuits

Limitation of conventional active devices at microwave frequency; Klystron, Two-Cavity Klystron Amplifiers, Reflex Klystron; Magnetron; TWT; BWO, their schematic, principle of operation, performance characteristics and applications.

UNIT- V **8**

Microwave Semiconductor Devices

PIN diode; Tunnel diode; Varactor diode; Schottky barrier diode; Gunn devices; IMPATT, TRAPATT, their principle of operation, characteristics and applications.

Reference Book

1. S.Y. Liao, *Microwave Devices & Circuits*, PHI, Third Edition,2009.
2. R.E.Collin, "*Foundations for Microwave Engg.",*Tata McGraw-Hill,Second Edition,1992.
3. Annapurna Das, "*Microwave Engg.",*Tata McGraw-Hill, 2000.

VLSI DESIGN & TECHNOLOGY

CEC-603 **Cr L T P**

4 3 1 0

UNIT-I **8**

Introduction to an integrated circuit technology**,** Moore's law, ITRS recent trends in design,

Crystal Growth

Silicon wafer Preparation & characterization, Oxidation: Thermal oxidation, the chemical reaction, Deal-Grove model, Oxide thicknessmeasurement, Oxidation system.

Film Deposition: Epitaxial growth of Si, Apparatus for Epitaxy, Vacuum deposition & Sputtering apparatus, CVD Processes and its applications in IC Lab.

UNIT-II **8**

Diffusion of dopants

Diffusion Eqns. Dopant profiles, sheet resistance, diffusion furnace, liquid and gaseous dopants. Ion Implantation: Ion implantation techniques, dopants profiles, apparatus used Ion implantation. Lithography: The principle of lithography, Lithography on limestone , Modern lithographic process, Mask making, photo resist & Etching Techniques, Introduction to Modern Lithography Techniques, Photolithography techniques for pattern transfer, Metallization,

UNIT -III **8**

Packaging

Packaging Hierarchy, Packaging Substrates, Plastic Packaging, Ceramic Packaging, Package Types, Die Attachment Techniques: Wire Bonding, Tape-Automated Bonding, Solder Bump Bonding. Introduction to Testing: Role of Testing, VLSI Testing Process and Automatic Test Equipment.

UNIT-IV **8**

Basic MOS transistor theory, MOS transistor threshold voltageV_{th}, MOS trans- conductance (g_m) and output conductance (g_{ds}) and MOS transistor figure of merit. NMOS Enhancement Transistor, PMOS Enhancement Transistor, The NMOS inverter, pull-up to pull-down ratio, CMOS inverter and its characteristics, latch-up in CMOS circuits, Body effect, sheet resistance, capacitances of layers, Gate delays, Delay estimation.

UNIT-V **8**

NMOS design style, CMOS design style, lambda based design rules, logical efforts, Scaling models and scaling factors, limitation of scaling, Limits of miniaturization. Stick diagrams,

NMOS, CMOS NAND Gates, NMOS, CMOS NOR gates, Combinational circuit design, Sequential circuit design.

Reference Books

1. S. M. Sze , "*VLSI Technology*", Tata Mc Graw–Hill, Second Edition,1988.
2. Douglas A. Pucknell, Kamran Eshraghian, "*Basic VLSI Design*", Prentice-Hall of India, Third Edition.
3. Neil H.E. Weste, KamranEshraghian, "*Principles of CMOS VLSI Design A systems Perspective*", Pearson Education,Third Edition,2009.
4. John P. Uyemura , "*CMOS Logic Circuit Design*", Kluwer Academic Publishers New York, Boston, Dordrecht, London, Moscow,Reprint 2002.
5. Plummer, "*Silicon VLSI Technology*",Pearson Education,First Edition,2001.
6. R. Jacob Baker, "*CMOS Circuit Design, Layout, and Simulation*", IEEE Press, New York, Second Edition,2005.
7. Sung-Mo Kang, Yusuf Leblebici, "*CMOS Digital Integrated Circuits Analysis and Design*", Tata Mc-Graw-Hill,Third Edition,2007

DIGITAL COMMUNICATION

CEC-604 **Cr L T P**

431 0

UNIT-I

Introduction to Digital Communication **9**

Analog anddigital messages; Model of a digital communication system; Sampling theory; Quantization; Introduction to source coding; Channel coding.

UNIT-II

Digital Base band Transmission **8**

PCM Coding; DM; DPCM; ADCM; Data transfer rate,; Line coding and its properties; NRZ & RZ types; Signaling format for unipolar, bipolar;Manchester coding and their power spectra; Matched filter receiver, derivation of its impulse response and peak pulse signal to noise ratio;Correlation detector, decision threshold and error probability for binary, unipolar (on-off) signaling; Inter symbol interference, nyquist criterion for zero inter symbol interferenceand raised cosine spectrum.

UNIT-III

Digital Modulation Techniques **11**

Gram-Schmidt orthogonalizationprocedure; Types of digital modulation, wave forms for amplitude, frequency and phase shift keying, method of generation and detection of coherent &non-coherent binary ASK, FSK ,PSK ,differential phase shift keying (DPSK), Quadraturephase shift keying QPSK; Probability of error and comparison of various digital modulation techniques.

UNIT-IV

Digital Multiplexing **3**

Fundamentals of time division multiplexing; Electronic commutator; Bit andbyte interleaving; T1 carrier system, synchronization and signaling of T1; PCM hierarchy; T1 to T4 PCM TDM system .

UNIT-V

Error Control Coding **9**

Error free communication over a noise channel; Hamming code, relation between minimum distance and minimum distance error correcting capability;Linear block codes; Encoding and syndrome decoding; Cyclic codes, encoder and decoder for cyclic codes; Convolution codes;Trellis diagram; Viterbi and sequential decoding, comparison of performance.

References Books

1. B.P Lathi, "*Modern Digital & Analog Communication Systems*", OxfordUniversity Press, Fourth Edition, 2010.
2. Simon Haykin,"*Communication Systems*",John Wiley ,Fourth Edition,2003.
3. Simon Haykin, "*Digital Communication*" , John Wiley , Fourth Edition, Reprint 2009.
4. R.P. Singh, & S.D. Sapre, "*Communication Systems: Analog & Digital*" , Tata McGraw-Hill, ,Seventh Edition ,Reprint 2003.

DSP LAB.

CEC-651 **CrLTP**

1 0 02

LIST OF EXPERIMENTS:

1. Introduction to DSP processors, TMS 320C6713 DSK, Introduction to Code Composer Studio
2. Generation of Sine wave using TMS 320C6713 kit
3. Generation of Square wave using TMS 320C6713 kit
4. Linear Convolution using TMS 320C6713 kit
5. Circular Convolution using TMS 320C6713 kit
6. Impulse response of first order systems using TMS 320C6713 kit
7. Impulse response second order systems using TMS 320C6713 kit
8. Generation of Real time sin wave using TMS 320C6713 kit
9. Real time FIR (LP/HP) Filter Design using TMS 320C6713 kit
10. Real time IIR (LP/HP) Filter Design using TMS 320C6713 kit
11. Audio application using TMS 320C6713 kit

Microwave Lab.

EC-652 **CrLTP**

1002

1 Study of microwave devices and components used in the lab.
2 Study of microwave equipments.
3 Mode characteristics of the reflex klystron.
4 Measurement of guide wavelength and frequency of the signal.
5 Characteristics of Gunn diode.
6 Measurement of VSWR and load impedance.
7 Study of directional couplers, measurement of directivity and coupling coefficient.
8 Waveguide Tees and study of characteristics.
9 Attenuators (fixed and variable type) and measurement of attenuation.
10 Isolators and circulators and study of characteristics.
11 Measurement of radiation pattern and measurement of gain of a waveguide horn antenna.

12 Design and analysis of rectangular patch antenna using IE3D software simulator.

13 Measurement of dielectric constant.

VLSI& Circuit Design Lab.

CEC-653	**CrLTP**
	1 002

LIST OF EXPERIMENTS:

Circuit Simulation Experiments using TANNER EDA Tool

1. Transient Analysis of NMOS inverter using pulse input.
2. DC Analysis (VTC) of NMOS inverter with parameters.
3. Transient Analysis of CMOS inverter using pulse input with parameters.
4. DC Analysis (VTC) of CMOS inverter with parameters.
5. Transient Analysis of NOR Gate CMOS design Style.
6. DC Analysis of NOR Gate CMOS design Style.
7. Transient Analysis of NAND Gate CMOS design Style.
8. DC Analysis of NAND Gate CMOS design Style.

Microcontroller & Embedded System

Cr L T P

DEC-601 4 3 1 0

Unit-I

Microprocessor and Micro-controller - 8051 Micro-controller hardware: 8051 oscillator and clock - Program counter and data pointer - A and B CPU register - Flags and PSW - Internal memory - Internal RAM - Stack and stack pointer - Special function registers - Internal ROM. Input / output pin, ports and circuits - External memory.

Unit-II

Counter and Timer: Counter / Timer interrupts - Timing - Timer modes of operation - Counting.

Serial data input / Output: Serial data interrupt - Data transmission - Data reception - serial data transmission modes.

Interrupts: Timer flag interrupt - Serial port interrupt - External interrupt - reset - Interrupt control - Interrupt priority - Interrupt destination - Software generated interrupts.

Unit-III

Introduction - Addressing modes - Byte level logic operations - Bit level logic operations - Rotate and swap operations - Simple program.

Arithmetic Operations: Introduction - Flags - Incrementing and Decrementing - Addition - Subtraction - Multiplication and Division - Simple Program.

Unit-IV

Introduction - External data move - code memory read only data move - PUSH and POP - Opcodes - Data exchange - Simple Programs.

Jump and Call instructions: Introduction - Jump and call program range - Jumps - Calls and subroutine - Interrupt and returns - more detail on interrupts - Simple programs.

Unit-V

Keyboard interfacing - Display interface - 7 segment and LCD display - D/A conversion - A/D conversion - Stepper motor Interface.

Reference Books

1. The 8051 Microcontroller and Embedded System - Mohamed Ali maszidi & Janice Gillespie Maszidi, Pearson Education.
2. The 8051 Microcontroller and Architecture - Predko Mic, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
3. The 8051 Microcontroller and Architecture, Programming and Applications - Kenneth J. Ayala, 2/e, Penram International.

Telecommunication System

Cr L T P

DEC-602 **4 3 1 0**

UNIT-1

Fundamental of Telecommunications:Transmission media: Guided and Unguided, Twisted pair cable (STP & UTP), Coaxial cable, fiber optic cable, radio waves, infrared, microwaves links & Satellite Communication. Propagation of signals at HF, VHF, UHF and microwave frequencies, Access- WILL/RILL, DECT, FITL, WAN-Frame Relay, ATM.

UNIT-2

Analog and Digital Communications: Fundamentals of signals, signal transmission and media, modulation &demodulation in analogue and digital systems, Sampling and data reconstructions, Quantization & coding, Time division and frequency division multiplexing, Basic information theory, Equalisation, amplification, crosstalk, attenuation. Digital Signal Processing: Discrete time signals and systems Z- transforms. Structures for digital filters. Frequency Transformations: Linear phase design. Introduction to DFT. Errors in digital filtering.

UNIT-3

Wireless / Wireline Networks: Introduction to Personal Communication Services (PCS): PCS architecture, Mobility management, Networks signaling. Global system for Mobile Communication (GSM) system overview: Global System for Mobile Communication Architecture, Mobility Management, Network signaling, General Packet Radio services (GPRS),

UNIT-4

Third Generation (3G) Mobile Services, Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (WCDMA) and CDMA 2000, Quality of services in 3G. Wireless local Loop (WLL): Introduction to WLL architecture, WLL technologies and Wi-Max, IP MPLS, architecture working of dial up connection, role of internet service provider (ISP) and working of ISDN and Broadband internet connection etc, E-commerce,Web enabled systems, virtual reality, and multimedia applications over Internet. Application Layer protocol: DNS, HTTP, FTP, TELNET.

UNIT-5

Protocol Engineering:Principles, stages, specification formalisms (UML, SDL, ASN.1) of telecom protocol design, protocol software development process, and computer aided protocol engineering, verification, object and testing of protocols oriented techniques in protocol development.

Principles of secured Communication

Cr L T P

DEC-603 **4 3 1 0**

UNIT-1

Data and Computer Communication Networks Data Communication, Transmission Methodologies, Data Link Layer, Multiple Access & Local Area Networks, Connecting Devices and Backbone Networks, Network Layer and Transport Layer, Application Layer.

UNIT-2

Mobile & Wireless Networks Wireless networking: wireless LANS & PANS, ad-hoc wireless networks & security, wireless sensor networks, Cellular Mobile Wireless Networks, Evolution of Modern Mobile Wireless Communication System.

UNIT-3

Cryptography and Network Security Introduction to the Concept of Security, Cryptographic Techniques, Computer-based Symmetric and Asymmetric Key Cryptographic Algorithms, Public Key Infrastructure (PKI), Internet Security Protocols, Network Security.

UNIT-4

Database Security Data management technologies: Information security, Information Management Technologies, Security policies, Policy enforcement & related issues, Design principles, Multilevel relational data models, Security impact on database function, inference problem

Software Security Defining a discipline, A Risk Management Framework, Code review with a tools, Architectural risk analysis, Software penetrating testing, Risk Based security Testing, An Enterprise S/W security program, Security knowledge

UNIT-5

Intrusion detection Defining Intrusion Detection, Security concepts intrusion Detection concept, determining strategies for Intrusion Detection, Responses, Vulnerability Analysis, Credentialed approaches, Technical issues.

Digital Control System

Cr L T P

DEC-604 **4 3 1 0**

UNIT-I

State Space Analysis of Continuous System: Review of state variable representation of continuous system, conversion of state variable models to transfer function and vice-versa, solution of state equations and state transition matrix, controllability andobservability, design of state observer and controller.

UNIT-II

Analysis of Discrete System: Discrete system and discrete time signals, state variable model and transfer function model of discrete system, conversion of state variable model to transfer function model and vice-versa, modeling of samplehold circuit, solution of state difference equations, steady state accuracy, stability on the z-plane and Jury stability criterion, bilinear transformation, Routh-Hurwitz criterion on rth planes.

UNIT-III

Stability: Lyapunov's stability theorems for continuous and discrete systems, methods for generating Lyapunov's function for continuous and discrete system, Popov.s criterion.

Non linear System: Types of non linearities, phenomena related to non - linear systems. Analysis of non linear systems-Linearization method, second order non-linear system on the phase plane, types of phase portraits, singular points, system analysis by phase-plane method, describing function and its application to system analysis.

UNIT-IV

Optimal Control: Introduction, formation of optimal control problem, calculus of variations minimization of functions, constrained optimization.Pontryagin.s Minimum Maximum Principle, Linear Quadratic Problem-HamiltonJacobi equation, Riccati equation and its solution.

UNIT-V

Adaptive Control: Introduction, modal reference adaptive control systems, controller structure, self tuning regulators. Introduction to neural network, fuzzy logic and genetic algorithms

Text Books:

1. M.Gopal, .Digital Control and State variable Methods., Tata Mc Graw Hill
2. Ajit K.Madal, .Introduction to Control Engineering: Modelling, Analysis and Design. New Age International.

Reference Books:

1. D.Landau, .Adaptive Control., Marcel Dekker Inc.
2. S.Rajasekaran & G.A.Vjayalakshmi Pai, .Neural Networks,Fuzzy Logic and Genetic
3. Alogorithms: Synthesis and Applications. Prentice Hall of India.

7th Semester

SATTELITECOMMUNICATION

CEC-701 **CrLTP**
4 3 1 0

UNIT-I **8**

Elements of Satellite Communication

Development of satellite communication, Orbital mechanics; Laws of astrodynamics , Look angle; Orbit determination launches launch vehicle; Orbital effects; Geostationary Orbit.

UNIT-II **8**

Satellite subsystems

Attitude and orbit control systems; Satellite antennas, Advantages of this type of antenna, Satellite link design; Basic transmission theory; System noise temperature and G/T ratio; Down link design, uplink design; Satellite systems using small earth station; Design for specified C/N ratio.

UNIT-III **8**

Modulation and multiplexing techniques for satellite links

FM; Pre-emphasis and de-emphasis,; S/N ratios for FM video transmission; Digital modulation and demodulation; TDM; Multiple accesses, FDMA, TDMA and CDMA, Steps in CDMA modulation.

UNIT- IV **8**

Error control for digital satellite links

Error detection and correction; Channel capacity; Error control coding; Convolution codes, linear and cyclic block codes.

Propagation effects and their Impact on satellite-Earth Links

Attenuation and depolarization; Atmospheric absorption; Rain, cloud and ice effects etc.

UNIT- V **8**

Introduction of various satellite systems

VSAT; Low earth orbit and non-geostationary; Direct broadcast satellite television and radio; Satellite navigation and the global positioning systems.

Reference Books

1.Pratt Bostian, Allnutt, "*Satellite Communications*" ,JohnWiley,Second Edition,2011.
2.Dennis Roddy , "*Satellite Communications*", McGraw-Hill,Third Edition,2001.
3.Tri T.Ha. , "*Digital Satellite Communications*", McGraw-Hill.

ANTENNA AND WAVE PROPAGATION

CEC-702 **Cr L T P**
4 3 1 0

UNIT-I

Fundamental Parameters of Antennas **10**

Definition ; Function and properties of antenna; Radiation pattern; Radiation power density; Radiation intensity; Gain, Directivity; Beam width; Bandwidth; Polarization; Antenna efficiency, Effective aperture; Antenna input impedance.

Retarded potential; Radiation fields of alternating current element; Radiated power and radiation resistance of current element; Radiation from monopole &half wave dipole; Radiation characteristics of dipoles.

UNIT-II

Antenna Arrays **5**

Two element array; Uniform linear arrays; Broad side and end fire arrays; Multiplication of patterns; Method of excitation of antenna, Antenna temperature and signal to noise ratio; Introduction to planner array.

UNIT-III

HF, VHF, UHF and Microwave Antennas **10**

Rhombic Antenna Design relation and advantages & disadvantages.

Loop Antenna Salient features and EMF equation of loop antenna.

Yagi-UDA Antenna Salient features &design parameters.

Helical Antennas Normal andAxial modes; Cornerreflector and parabolic reflector antennas.

Horn Antenna Salient features & applications.

UNIT-IV

Wave Propagation **10**

Propagation characteristics of EM wave ; Factors involved in the propagation of radio waves; Modes of propagation, ground wave, ground wave field strength; Reflection of radio wave by the surface of earth, wave Tilt of the ground wave; Space wave or Troposphere wave propagation, field strength due to space wave, atmospheric effect in space wave propagation; Duct propagation; Radio horizon; Line of sight (LOS); Ionospheric wave propagation, characteristics of ionosphere, refractive index of ionosphere; Phase and group velocities; Virtual height; MUF, Critical frequency; Skip distance; Sky wave field strength; Fading and Diversity technique.

UNIT-V

Antenna Measurements **5**

Radiation pattern measurement; Introduction to phase measurement; Gain measurement; Directivity measurement; Polarization measurement; Impedance measurement; Measurement of antenna efficiency; Measurement of noise figure and noise temperature of an antenna.

Reference Books

1. C A.Balanis , "*Antenna Theory*", John Wiley ,Second Edition,2009.
2. JohnD. Kraus, Ronald J. Mashefka, "*Antenna for All Applications*", Tata McGraw-Hill,

Second Edition, Reprint 2007.
3. G.S.N.Raju, "*Antenna &Wave Propagation*", Pearson Education India, Reprint 2005.
4. K.D. Prasad,"*Antennas and Wave Propagation*", Satya Prakashan,Third Edition,Reprint 2005.
5. Jordan and Balman, "*Electromagnetic Waves and Radiating Systems*", PHI.

OPTICALFIBER COMMUNICATION

CEC-703 **CrLTP**
4 310

UNIT-I

Introduction **8**

Block diagram of optical fiber communication system, Advantages of optical fiber communication. Optical fiber waveguides:structureofopticalwaveguide,light propagationinopticalfiberusingraytheory,acceptanceangle, numerical aperture,skewrays,wavetheory for optical propagation,modesinaplanar andcylindrical guide,mode volume,singlemodefibers, cutoffwavelength,modefielddiameter,effectiverefractiveindexandgroupandmode delay factor forsingle mode fiber.

UNIT-II

TransmissionCharacteristicsofOpticalfiber,Attenuationinopticalfibers,intrinsicandextrinsicabsorption,linear andnonlinearscatteringlosses,fiberbendlosses.Dispersionandpulsebroadening,intramodalandintermodal dispersionforstepandgradedindexfibers,modalnoise,overallfiberdispersionformultimodeandmonomodefiber, dispersionshifted fibers,modal birefringenceand polarizationmaintaining fibers

UNIT-III

Optical Sources **8**

Basic conceptsEinsteinrelationsandpopulationinversionopticalfeedbackandthresholdconditions,direct andindirect bandgapsemiconductors.spontaneousandstimulatedemissioninp-njunction,thresholdcurrent density,Hetero junction&DH structure,semiconductorinjectionlasersstructure & Characteristics of injectionlaser. Drawbacks and advantagesofLED, DH, LED,LEDstructures and characteristics.

UNIT-IV

Optical detectors **8**

Requirement for photo detections p-n photodiode, characteristics of photo detections, p-i-n and avalanche photodiodes, phototransistors &photoconductors. Direct detectionreceiver performance considerations: Noise sourcesinoptical fiber communication,noise inp-n, p-i-nand APD receivers, Receiverstructures.

UNIT-V

Opticalfibercommunicationsystems11

Principalcomponentsofanopticalfibercommunicationsystem,sourcelaminations,opticaltransmitter circuits,LED andlaserdrivecircuits,opticalreceiverblockdiagram,simplecircuitsforpre-amplifier,automaticgaincontroland equalization,Regenerativerepeater,BERofopticalreceiver,channellosses,ISIpenaltyandopticalpow

erbudgeting
fordigitalopticalfibersystem,linecoding,analogsystems,Directintensityandsubcarrierintensitymodulationusing AM,FMand PM.Block diagramanddetection principleof coherent optical fiber.

Reference Books

1. JohnM.SSenior , "*Optical fiber Communication*" ,PHI, ThirdEdition,2007.
2.J.M Senior, "*Optical Communication*",3rd Edition.
3.G.E.Keiser, "*Optical fiber Communication*", McGraw-Hill, Fourth Edition,2008.

WIRELESSCOMMUNICATION

EC-704 **CrLTP**

4 3 10

UNIT- 1 **6**

Introductionto wireless communication

1G, 2G,3G wirelessnetwork; Mobile radiopropagation: introduction,free spacepropagationmodel,relatingpowerto electricfield;Propagationmechanism; Reflection;Diffraction;Scattering; Groundreflectionmodel; Fresnelzonegeometrywithknifeedgediffractionmodel; Practicallinkbudget design usinglathload,modelsbased onfrequency range.

UNIT-2 **6**

Fading

Smallscaleandlargescalefading; Factorsaffectingfading; Dopplershift; Impulseresponsemodel of multipathchannel; Partameters ofmobilemultipathchannels; Types ofsmallscalefading,; Theoryof multipathshape factors for small scale fadingwireless channel.

UNIT-3 **8**

SpreadspectrumModulationtechniques

DS-SS;FH-SS,modulationperformanceInfading;Linearandnonlinear equalizer;Diversity techniques;RAKEreceiver.

UNIT-4 **8**

Characterizationof speechsignal; Quantization techniques;Vocoders; Linear Predictivecoders; FDMA;TDMA;CDMA;SDMA.

UNIT-5 **8**

Cellular concepts

Frequency reuse,channelassignment techniques;Handoff strategies; Interferenceandsystem capacity; Improving coverage; capacity in cellular system.

Reference books

1. Theodore S Rappaport , "*Wireless Communication*", Pearson Publication,Second Edition, 2010.
2. K. Feher , "*Wireless Digital Communication*", PHI,EightEdition.

3. Mark & Zhuang , "*Wireless Communication & Networking*".

VHDL Lab

CEC-751 **CrLTP**

4 310

LIST OF EXPERIMENTS:

Digital Circuit Synthesis, Simulation and Implementation using (Xilinx ISE + ModelSim Tool)

1. Synthesis, Simulation and Implementation of Full Adder
2. Synthesis, Simulation and Implementation of Full Subtractor.
3. Synthesis, Simulation and Implementation of 3:8 Decoders.
4. Synthesis, Simulation and Implementation Simulation of 8 X 1 Multiplexer.
5. Synthesis, Simulation and Implementation of 9 bit odd parity generator.
6. Synthesis, Simulation and Implementation Simulation of Flip Flop (D, and T).
7. Synthesis, Simulation and Implementation of magnitude comparator.
8. Synthesis, Simulation and Implementation of Half Adder.
9. Synthesis, Simulation and Implementation of JK flip flop.
10. Synthesis, Simulation and Implementation of decade counter.

VHDL

DEC-701 **CrLTP**

4 3 10

Introduction To Hardware Design: Digital System Design Process, Hardware Description Languages, Hardware Simulation, Hardware Synthesis, Levels of Abstraction.

VHDL Background: VHDL History, Existing Languages, VHDL Requirements, The VHDL Language.

Design Methodology Based On VHDL: Elements of VHDL, Top down Design, Top down Design with VHDL, Subprograms, Controller Description, VHDL Operators, Conventions and Syntax.

Basic Concepts In VHDL: Characterizing Hardware Languages, Objects and Classes, Signal Assignments, Concurrent and Sequential Assignments.

Design Organization and Parameterization: Definition and Usage of Subprograms, Packaging Parts and Utilities, Design Parameterization, Design Configuration, Design Libraries.

Utilities For High-Level Descriptions: Type Declarations and Usage, VHDL Operators, Subprogram Parameter Types and Overloading, Other Types and Type Related Issues, Predefined Attributes, User Defined Attributes.

Dataflow Descriptions In VHDL: Multiplexing and Data Selection, State Machine Description, Three State Bussing.

Behavioral Description of Hardware: Process Statement, Assertion Statement, Sequential Wait Statements, Formatted ASCII I/O Operations, MSI Based Design.

Verilog: Overview of Digital design with Verilog HDL, Hierarchical modeling concepts, basic concepts, modules & ports.

REFERENCE BOOKS:

1. J. Bhasker, *A VHDL Primer*, Third Edition, PH/Pearson, 1999.
2. J. Bhasker, *A VHDL Synthesis Primer*, Second Edition, Star Galaxy, 1998.
3. J. Bhasker, *A Verilog HDL Primer*, Second Edition, Star Galaxy, 1999.
4. J. Bhasker, *A Verilog Synthesis : A Practical Primer*, Star Galaxy, 1998.
5. M. J. S. Smith, *Application Specific Integrated Circuits*, AW/Pearson, 1997.
6. Z. Navabi, *VHDL : Analysis and Modeling of Digital Systems,* Second Edition, MH, 1998..
7. J. Armstrong and F. G. Gray, *VHDL Design Representation and Synthesis*, Second Edition, PH/Pearson, 2000.
8. P. J. Ashenden, *The Designer's Guide to VHDL*, Second Edition, Morgan Kaufmann, 2001.
9. D. Naylor and S. Jones, *VHDL : A Logic Synthesis Approach*, Chapman & Hall, 1997.

RADAR & NAVIGATIONAL AIDS

DEC-702 **CrLTP**
4 3 10

UNIT-I **10**

RADAR SIGNAL MODELS

Amplitude models; Distributed targetforms of range equation, radar cross section, statistical description ofradar cross section, Swerling model, Clutter, signal to clutter ratio,temporal and spatial correlation of clutter, noise model and signal tonoise ratio, frequency models, Doppler shift, simplifies approach toDoppler shift, stop and hop assumption, spatial model, variationwith angle, variation with range, projections, multipath, spectralmodels.

UNIT-II **6**

RADAR WAVE FORMS

Waveform matched filter of movingtargets, ambiguity function, ambiguity function of the simplematched pulse filter for the pulse burst, pulse by pulse processing,range ambiguity, Doppler response and ambiguity function of thepulse burst.

UNIT-III **8**

DETECTION FUNDAMENTALS

Radar detection as hypothesis testing; Neyman-Pearson detection rule; Likelihood ratio test; Threshold detection of radar signals; Non-coherent integration of non fluctuating targets; Albersheim and Shnidaman equations,; Binary integration.

UNIT- IV **6**

RADIO DIRECTION FINDING

Loop direction finder; Goniometer; Errors in direction finding; Automatic direction finders; Commutated aerial direction finder.

RADIO RANGES

LF/MF four course radio range; VOR; Ground equipment & receiver.

HYBERBOLIC SYSTEM OF NAVIGATION

LORAN Decca and Omega system.

UNIT- V **10**

AIDS TO APPROACH AND LANDING

Beam configuration; Doppler frequency equation; Track stabilization and Doppler spectrum; Components of
Doppler navigation system; Doppler radar equipment; CW & FMCW Doppler radar, frequency trackers; Doppler range equation.

SATALLITE NAVIGATION SYSTEM

Transit system; NAVSTAR, GPS, basic principles of operation; Signal structure of NAVSTAR broadcasts.

Reference Books

1. Mark A Richards , "*Fundamentals of radar signal processing*",TMH.
2. N. S. Nagraja, " *Elements of Electronics Navigation*", TMH.
3. P.Z.Jr.Peebles, "*Radar principles*", John Wiley.

Digital Image Processing

DEC-703 Cr LTP

4 3 10

Unit-I

Introduction

Fundamentalstepsinimage processing; Elementsofimage processing;Simpleimagemodel,Image formation and perception, Sampling&quantization.ImageTransforms:One-dimensional&Two-dimensionalDFT, Cosine,Sine,Hadamard,Haar,andSlant &KLtransforms.

Unit-II

Image Enhancement&Restoration

Introduction; Pointoperations; Histogrammodeling; Spatial operations; Transformoperations;Image observation models; Inverse &Wiener filtering;Difference between enhancement & restoration; Restoration-spatial filtering; Noise reductionin frequencydomain.

Unit- III

ImageCompression &Segmentation

Introduction; Pixel coding; Predictivecoding (lossless and lossy); Transformcoding;

Inter frame coding, Introduction; Spatial feature extraction; Transforms features; Edge detection; Boundary extraction; Segmentation techniques.

Unit-IV

Introduction to MATLAB

The MATLAB Environment, Variables and Arrays, Initializing Variables in MATLAB, Displaying Output Data, Built-in- MATLAB Functions, Introduction to Plotting.

Unit- V

User-Defined Functions

Introduction to MATLAB Functions, Variable passing in MATLAB: The Pass-By-Value Scheme, Sharing Data Using Global Memory, Preserving Data between Call to a Function, Additional two-Dimentional Plots, Three-dimentional plots.

IC Fabrication & Testing

DEC-704

Cr LTP

4 3 10

Unit - I CMOS SUBSYSTEM DESIGN

Introduction – Data path operations –Parity generator – Comparators – Zero/one detectors- Binary counters – Boolean operations – Multiplication – Shifters.

UNIT - II MEMORY ELEMENTS

Read/write memory :- RAM- Register files – FIFOs, LIFOs, SIPOs- Serial Access memory. Read only memory – Content Addressable memory - Finite – State Machine – FSM Design procedure – Control Logic implementation :- PLA Control implementation – ROM Control implementation – Multilevel logic – An example of control logic implementation.

UNIT - III TESTING OF COMBINATIONAL CIRCUITS

Faults in digital circuits – Failures and faults – Modeling of faults – Temporary faults – Test generation for Combinational logic circuits – testable combinational logic circuit design – Scan based design and JTAG testing issues.

UNIT - IV TESTING OF SEQUENTIAL CIRCUITS

Test generation for sequential circuits – Design of testable sequential CK5- Built in self test – Testable memory design.

UNIT - V VERIFICATION AND TESTING

Verification – Timing verification – Testing concepts – Fault coverage – ATPG – Types of tests – Testing FPGAs – Design for testability.

Reference Books

1. N.H.E.Weste and K.Eshraghian, " Principles of CMOS VLSI Design", 2nd Edition - Addition Wesley,1993.

2. Jan .M.Rabaey, "Digital Integrated Circuits a design perspective" , PHI 1st Edition, 1995