Graphic Era
HILL UNIVERSITY

Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)

BOARD OF STUDIES

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Meeting : **Third**

Date : **April 17th, 2013**

Time : **10:30AM**

Venue : **Conference Room, GEHU**
Bell Road, Clement Town
Dehradun

PROPOSED

SCHEME OF STUDY & EVALUATION

FOR

B. Tech. in Electronics & Communication Engineering

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Graphic Era Hill University
Dehradun

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Minutes of the meeting of the Board of Studies of Department of Electronics & Communication Engg held on 17th April, 2013

Present:

Sl.No	Name	Address	Signature
1.	Prof(Dr).S.C.gupta	Professor Emirateus,IIT Roorkee	S. C. Gupta
2.	Dr.N.P.Pathak	Dept of ECE, IIT Roorkee	Npathak 17/4/2013
3.	Dr.R.Gowri	GEHU	17/4/13
4.	Mr.Sundeep Sunori	GEHU, Bhimtal Campus	17/4/13
5.	Mr.Samitpal Singh	GEHU	17/4/13
6	Mr.Mridul Gupta	GEHU	17/4/2013
7.	Mr.Prabhat Kumar	GEHU	17/4/13
8	Mr.Nitin Kumar	GEHU	17/4/13

Following agenda are discussed:

1.The Board of Studies considered the regulations of the University and recommended to the Academic Council for approval with retrospective effect i.e. from the start of Academic Session 2012 – 13.

2. The Board of Studies considered the syllabus /scheme of examination/ relevant ordinances for B.Tech (ECE,EEE) , M.Tech (Communication Systems) for full time & Part time , M.Tech (RF & Microwaves) full Time/ part Time course as applicable from the academic session 2012-13 onwards and recommended to the Academic Council for approval.

3. Under any other item with the permission of chair:

(Signature of BOS Members)

Guidelines for the admission in B.Tech in Electronics & Communication Engineering

Admission to various of branches of Engineering in both Under graduate and post Graduate courses will be based on the following selection process duly approved by the Board of Studies & Academic Council and the Board of Management of the University from time to time.

1.1 Regular Admission:

Regular admission in B.Tech programme will be done strictly on merit basis through an open counseling conducted by the university. AIEEE ranks or any other common entrance exam or the entrance test conducted by the university may be considered as merit for admission and will be decided at the time of advertisement for admission by the Academic Council and the Board of Management of the university or by the competent authority of the University.

Candidate who has passed intermediate or (10+2) standard with an aggregate pass percentage of 50%, from any Board with Physics, Mathematics along with any one of Chemistry or Computer Science is eligible for admission to the first year/1st semester in different branches of the programme.

1.2 Lateral Admission:

Lateral admissions in case of B.Tech will be done strictly on merit basis through an open counseling conducted by the university, pass percentage of the qualifying exam or the entrance test conducted by the university may be considered as merit for admission and will be decided at the time of advertisement for admission by the Academic Council and the Board of Management of the university.

1.2.1 A candidate who has passed the 3 year Diploma in Engineering from a recognized institution as decided by the Academic Council and the Board of Management of the University, securing a minimum of 60% marks, is eligible for admission in the second year/3rd semester to the respective branches or an equivalent branch as deemed fit by the Academic Council and the Board of Management of the university from time to time.

1.2.2 A candidate who has passed B.Sc. degree with minimum 60% marks in the qualifying examination, from a recognized university/institution as decided by the Academic Council and the Board of Management is eligible for admission in the Second year/3rd semester of the programme to the respective branches as per the rules prescribed from time to time by the Academic Council and the Board of Management of the university.

SCHEME OF STUDY AND SYLLABUS

FOR

B.TECH

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

PHYSICS GROUP (SEMESTER I)

S.No.	Code	Subjects Name	L	T	P	Credits	Contact Hours
	Theory						
1	TMA-101	Engineering Mathematics I	3	1	0	4	4
2	THU-101	Professional Communication	3	0	0	3	3
3	TCS-101	Fundamentals of Computers and introduction to C Programming	3	0	0	3	3
4	TPH-101	Engineering Physics	3	0	0	3	3
5	TEE-101	Basic Electrical Engineering	3	1	0	4	4
6	TME-101	Basic Mechanical Engineering	3	1	0	4	4
7	TME-103	Engineering Graphics	2	0	0	2	2
	Practicals						
1	PCS-151	Computer Lab I	0	0	4	2	4
2	PPH-151	Physics Lab	0	0	2	1	2
3	PEE-101	Basic Electrical Engineering Lab	0	0	2	1	2
4.	PME-153	Computer Aided Engineering Graphics Lab	0	0	3	2	3
5.	SE-101	Seminar	0	0	2	1	2
6.	GP-101	General Proficiency	0	0	0	1	0
		TOTAL	**20**	**3**	**13**	**31**	**36**

PHYSICS GROUP (SEMESTER II)

S.No.	Code	Subjects Name	L	T	P	Credit	Contact Hours
	Theory						
1	TMA-201	Engineering Mathematics II	3	1	0	4	4
2	THU-201	Advanced Professional Communication	3	0	0	3	3
3	TCS-201	Programming in C	3	0	0	3	3
4	TPH-201	Engineering Physics	3	0	0	3	3
5	TEE-201	Basic Electrical Engineering	3	1	0	4	4
6	TME-201	Basic Mechanical Engineering	3	1	0	4	4
7	TME-203	Engineering Graphics	2	0	0	2	2
	Practicals						
1	PCS-251	Computer Lab II	0	0	4	2	4
2	PPH-251	Physics Lab	0	0	2	1	2
3.	PEE-201	Electrical Engineering lab	0	0	2	1	2
4.	PME-253	Computer Aided Graphics Lab	0	0	3	2	3
5.	SE-201	Seminar	0	0	2	1	2
6.	GP-201	General Proficiency	0	0	0	1	0
		Total	**20**	**3**	**13**	**31**	**36**

CHEMISTRY GROUP (SEMESTER I)

S.No.	Code	Subjects Name	L	T	P	Credit	Contact hours
	Theory						
1	TMA-101	Engineering Mathematics I	3	1	0	4	4
2	THU-101	Professional Communication	3	0	0	3	3
3	TCS-101	Fundamentals of Computers and introduction to C Programming	3	0	0	3	3
4	TCH-101	Engineering Chemistry	3	0	0	3	3
5	TEC-101	Basic Electronics Engineering	3	1	0	4	4
6	TME-102	Engineering Mechanics	3	1	0	4	4
7	TEV-101	Environmental Science	3	0	0	3	3
8.	THF-101	Healthy Living & Fitness	1	0	0	1	1
	Practicals						
1	PCS-151	Computer Lab I	0	0	4	2	4
2	PCH-151	Chemistry Lab	0	0	2	1	2
3.	PEC-101	Basic Electronics Engineering lab	0	0	2	1	2
4.	PME-151	Workshop	0	0	3	2	3
5.	GP-101	General Proficiency	0	0	0	1	0
		Total	**22**	**3**	**11**	**32**	**36**

CHEMISTRY GROUP (SEMESTER II)

S.No.	Code	Subjects Name	L	T	P	Credit	Contact hours
	Theory						
1	TMA-201	Engineering Mathematics II	3	1	0	4	4
2	TCS-201	Programming in C	3	0	0	3	3
3	THU-201	Advanced Professional Communication	3	0	0	3	3
4	TCH-201	Engineering Chemistry	3	0	0	3	3
5	TEC-201	Basic Electronics Engineering	3	1	0	4	4
6	TME-202	Engineering Mechanics	3	1	0	4	4
7	TEV-201	Environmental Science	3	0	0	3	3
8.	THF-201	Healthy Living & Fitness	1	0	0	1	1
	Practicals						
1	PCS-251	Computer Lab II	0	0	4	2	4
2	PCH-251	Chemistry Lab	0	0	2	1	2
3.	PEC-201	Basic Electronics Engineering lab	0	0	2	1	2
4.	PME-251	Workshop	0	0	3	2	3
5.	GP-201	General Proficiency	0	0	0	1	0
		Total	**22**	**3**	**11**	**32**	**36**

Semester III

S. No.	Code	Subjects Name	L	T	P	Credits	Contact hours
	Theory						
1	TEC-301	Semiconductor Physics and Devices	3	1	0	4	4
2	TEC-302	Digital Electronics	3	1	0	4	4
3	TEE-301	Network Analysis and Synthesis	3	1	0	4	4
4	TMA-310	Advanced Engineering Mathematics	3	1	0	4	4
5	TEC-303	Signals & Systems	3	1	0	4	4
6.	XCS-300	Career Skills	2	0	0	2	2
	Practicals						
1	PEE-301	Network Analysis and Synthesis	0	0	3	2	3
2	PEC-302	Digital Electronics Lab	0	0	3	2	3
4	PEC-303	PCB & ORCAD Lab	0	0	2x2	2	4
5	SEC-301	Seminar	0	0	2	1	2
6	GP-301	General Proficiency	-	-	-	1	-
		Total				**30**	**34**

Semester IV

S. No.	Code	Subjects Name	L	T	P	Credits	Contact hours
	Theory						
1	TEC-401	Analog Electronics	3	1	0	4	4
2	TEC-402	Microprocessor & its applications	3	1	0	4	4
3	TEC-403	Analog Communication	3	1	0	4	4
4	TEC-404	EMFT	3	1	0	4	4
5	TCS-410	Data structures using C	3	0	0	3	3
6	XCS-400	Career Skills	2	0	0	2	2
	Practicals						
1	PEC-401	Analog Electronics Lab	0	0	3	2	3
2	PEC-402	Microprocessor Lab	0	0	3	2	3
4	PCS-410	Data Structure Lab	0	0	2x2	2	4
5	PEC-403	Analog Communication Lab	0	0	3	2	3
6	SEC-401	Seminar	0	0	2	1	2
7	GP-401	General Proficiency	-	-	-	1	-
		Total				**31**	**36**

Semester V

S. No.	Code	Subjects Name	L	T	P	Credits	Contact hours
	Theory						
1	TEC-501	Digital Communication	3	1	0	4	4
2	TEC-502	Microcontroller	3	0	0	3	3
3	TEC-503	Control Systems	3	1	0	4	4
4	TEC-504	Antenna & Wave Propagation	3	1	0	4	4
5	TEC-505	Linear Integrated Cirtcuits	3	1	0	4	4
6	XCS-500	Career Skills	2	0	0	2	2
	Practicals						
1	PEC-501	Digital Communication Lab	0	0	3	2	3
2	PEC-502	Microcontroller Lab	0	0	3	2	3
3	PEC-503	Control Systems using MATLAB Lab	0	0	3	2	3
4	PEC-504	Linear Integrated Cirtcuits Lab	0	0	3	2	3
5	SEC-501	Seminar	0	0	2	1	2
6	GP-501	General Proficiency	-	-	-	1	-
		Total				**31**	**35**

Semester VI

S. No.	Code	Subjects Name	L	T	P	Credits	Contact hours
	Theory						
1	TEC-601	Electronic Measurement Instrumentation	3	0	0	3	3
2	TEC-602	Microwave Engineering	3	1	0	4	4
3	TEC-603	VLSI Technology & Design	3	1	0	4	4
4	TEC-604	Digital Signal Processing	3	1	0	4	4
5	TOE---	Open Elective	3	0	0	3	3
6	XCS-600	Career Skills	2	0	0	2	2
	Practicals						
1	PEC-601	Microwave Lab	0	0	3	2	3
2	PEC-602	VLSI Design Lab	0	0	3	2	3
3	PEC-603	Digital Signal Processing Lab using MATLAB	0	0	3	2	3
4	SEC-601	Seminar	0	0	2	1	2
5	GP-601	General Proficiency	-	-	-	1	-
		Total				**28**	**31**

OPEN ELECTIVE:

TOE -601 Object Oriented Programming

TOE -602 Advanced Control Systems

TOE -603 Computer Architecture

TOE-604 Operating Systems

Students will undergo 6 weeks summer training after the completion of the sixth semester.

Seminar VII

S. No.	Code	Subjects Name	L	T	P	Credits	Contact Hours
	Theory						
1	TEC-701	Telecommunication Switching	3	0	0	3	3
2	TEC-702	Optical Communication	3	0	0	3	3
3	TEC-703	Wireless communication	3	0	0	3	3
4	TMM-704	Principle of Management	3	0	0	3	3
5	TEC ---	Elective-I	3	0	0	3	3
6	XCS-700	Career Skills	2	0	0	2	2
	Practicals						
1	PEC-701	Seminar on Industrial Training	0	0	2	1	2
2	PEC-702	CAD of Electronics Ckts Lab	0	0	3	2	3
3	PEC-703	Project phase-I	0	0	6	3	6
4	GP-701	General Proficiency	-	-	-	1	-
		Total				**24**	**28**

List of ELECTIVE –I:

TEC-711 Data Communication & Networks

TEC-712 Reliability Theory

TEC 713 Radar & Navigation Aids

TEC-714 Biomedical Instrumentation

Semester VIII

S. No.	Code	Subjects Name	L	T	P	Credits	Contact Hours
	Theory						
1	TEC-801	Satellite Communication	3	0	0	3	3
2	TEC---	Elective-II	3	0	0	3	3
3	TEC---	Elective-III	3	0	0	3	3
	Practicals						
1	PEC-801	Project Phase - II	0	0	12	6	12
2	GP-801	General Proficiency	-	-	-	1	-
		Total				**16**	**21**

List of ELECTIVE –II:

TEC-821 Digital Image Processing TEC-822 Spread Spectrum System

TEC-824 Embedded Systems TEC-823 Filter Design

List of ELECTIVE –III:

TEC-831 Communication Electronics Circuits TEC-832 Advanced Microprocessors

TEC-833 Digital Signal Processor & applications

TEC-834 Artificial Neural Networks & Fuzzy logic

Note:

End Term theory Examination : 60 marks **End term lab examination : 50 marks**

Mid Term theory Examination : 30 marks **Mid term lab examination :30 marks**

Course Code: TEC 101/201
Course Name: Basic Electronics Engineering **L T P C**
3 1 0 4

Unit-I
Semiconductors **7hrs**
Insulators, metals and semiconductors, Intrinsic Extrinsic semiconductor, Current components, Mobility, conductivity, current density, charge density, mass action law, continuity equation.

Unit-II
Diodes and diode circuits **12 hrs**
PN junction diode: Diffusion and drift of carriers, diode characteristics, junction breakdown, effect of temperature on characteristics, Si versus Ge diode, ON/OFF of diode,load line analysis, static and dynamic resistance, power dissipation. Types of diode: Zener diode, photodiode, LED, varactor diode, Tunnel diode.
Diode circuits, Half wave rectifier, full wave bridge rectifier, centre tapped transformerfullwave rectifier, PIV, ripple factor and efficiency. Introduction to filters: C, L, LC, Pi filters. Basic regulator supply using Zener diode, Clippers and clampers.

Unit-III
Transistors **10 hrs**
BJT (Bipolar junction transistor): Construction, characteristics of common base, common emitter, common collector configuration, I_{CBO} and I_{CEO}, load line analysis, power rating of BJT, biasing circuits of BJT's.
Field effect transistor: Construction and characteristics of JFET, D MOSFET and E MOSFET, biasing circuits of JFET and MOSFET.

Unit-IV
Operational amplifiers **5 hrs**
Introduction to OPAMP, basic characteristics of OPAMP, Ideal OPAMP applications: Inverting non-inverting configuration, adder, subtractor, integrator, differentiator.

Unit-V
Digital logic **8hrs**
Number system and conversion, fractional numbers, addition, subtraction (1's and 2's complement), BCD numbers and their arithmetic (addition and subtraction), Boolean algebra and its simplification using only Boolean laws, logic gates, EXOR and EXNOR using universal gates, realization of given Boolean expression using only basic gates.

Suggested readings:
1. MillmanHalkiyas, "Integrated electronics", TMH, 2nd edition.
2. Boylestad L Robert, "Electronic devices and circuit theory", Pearson, 9th edition.
3. Floyd L Thomas, "Digital Fundamentals", Pearson, 10th edition.

PEC-101/201 Basic Electronics Engineering Lab

L	T	P	C
0	0	2	1

1. Familiarization of electronic measuring instruments and components.
2. Measurement of voltage, frequency using CRO.
3. Measurement of Resistance, capacitance, voltage, current using multimeter.
4. Study VI characteristics of PN junction diode.
5. Study of logic gates.
6. Study of V-I characteristics of p-n junction diode and determine the static and dynamic resistance from the characteristic curve.
7. Study of V-I characteristics of zener diode and determine its voltage regulation.
8. Study of half wave rectifier with and without capacitor filter.
9. Study of full wave rectifier with and without capacitor filter.
10. Study of input and output characteristics of common base (CB) transistor**.**

Course Code: TEC 301
Course Name: Semiconductor physics and devices **L T P C**
3 1 0 4

Unit-I
Introduction to semiconductors **9 hrs**
Metals, Insulators and semiconductors, energy bands,electron and holes, effective mass, Fermi dirac probability function and Fermi energy
Intrinsic semiconductor: Equilibrium distribution of electrons and holes, n_o and p_o equations, intrinsic carrier concentration, intrinsic Fermi level
Extrinsic semiconductor: Equilibrium distribution of electrons and holes, $n_o p_o$ product, degenerate and non degenerate semiconductors, variation of E_F with doping concentration and temperature.

Unit-II
Carrier transport phenomena **7 hrs**
Carrier drift: Drift current density, mobility, conductivity, velocity saturation. Carrier diffusion: Diffusion Current density, total current density. Einstein relation, Hall effect Excess carrier generation and recombination, continuity equation.

Unit-III
PN junction **9 hrs**
Basic structure of PN junction, Zero applied bias: contact potential, space charge width, electric field. Reverse applied bias: space charge width, electric field, junction capacitance. Forward biased PN junction, I-V relationship, minority carrier distribution, temperature effects, small signal model of PN junction, generation recombination currents, junction breakdown, charge storage and diode transients.

Unit-IV
Types of Diodes **7hrs**
Schottky barrier diode: metal semiconductor rectifying contact, qualitative characteristics, ideal junction properties, current voltage relationship, comparison with pn junction diode.Construction and characteristics: Zener diode, LED, Varactor diode, Tunnel diode, Photodiode.

Unit-V
Transistors **10hrs**
BJT: Transistor action: Principle and modes of operation (CB, CE, CC).Non ideal effects: Early effect,breakdown voltage. Circuit models: Ebers Moll model, Hybrid pi model,internal capacitances and high frequency model.
MOSFET: MOSFET operation: Structure, I-V relationship, mathematical derivation, transconductance. Non ideal effects:channel length modulation, threshold voltage modification. Circuit models: Small signal circuit, internal capacitances and high frequency model.

Suggested readings:
1.Neaman A Donald, “Semiconductor physics and devices”, McGrawHill, 3rd edition.
2.Streetman Ben G, “Solid state electronic devices”, Pearson, 6th edition.

Course Code: TEC-302

Course Name: Digital Electronics **L T P C**

3 1 0 4

Unit-I **6hrs**

Review of number systems: Binary, Octal, Hexadecimal, Complements, Signed binary numbers, arithmetic operation, Binary codes. Error detection and correction.

Unit-II **8hrs**

Boolean algebra and gate level minimization: Basic definition, Boolean logic, postulates, theorems and properties. Digital Logic gates, K-Map method for minimization upto six variables, Quine-Meclusky method for minimization, NAND and NOR implementation.

Unit-III **8hrs**

Combinational Logic: Combinational circuits. Analysis procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary multiplier, Magnitude Comparator, Decoder, Encoder, Multiplexers, Demultiplexers, Code Converters. Static and dynamic hazards.

Unit-IV **12hrs**

Sequential Logic: Latches, FFs (RS, JK, D, T) , State Reduction and assignment, FF conversion . Register: Types of registers, Design &its Application. Counter: Synchronous Counter and asynchronous Counter. Design of Asynchronous and Synchronous sequential Circuits.

Unit-V **8hrs**

Logic Family (Digital Integrated Circuits): Introduction, special characteristics, RTL, DTL, TTL, ECL, Realization of universal gates using MOS. PLA & PAL, ROM, PROM and basic introduction to RAM.

Suggested Readings:

1. Mano M. Morris and Ciletti M. D. ,*'Digital Design'* Pearson Education 4th Edition.
2. Malvino Leach, Saha,'Digital Principles and applications' , TMH
3. Floyd L. Thomas, 'Digital Fundamentals', Pearson, 10th Edition
4. Sedra A.S. & Smith K.C., '*Microelectronic Circuits'*, (5/e), Oxford, *2004*.
5. Jain R.P.,'Digital Electronics', PHI.
6. Switching & Finite Automata theory - ZviKohavi, TMH,2nd Edition
7. Taum&Shcilings, Digital Electronics, TMH
8. TTL handbook.

Course Code: TEE 301
Course Name: Network Analysis & Synthesis **L T P C**
3 1 0 4

Unit-I **10hrs**

Network Concepts and Theorems: Elements and sources, Kirchoff's laws, Node and Mesh analysis,Super-position theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem, Millman's theorem, compensation theorem, Tellegen's theorem, magnetically coupled circuits.

Unit-II **6hrs**

Graph Theory: Graph of a Network, definitions, tree, co tree, link, chords, Incidence matrix, cut set matrix, Tie set matrix, Duality, Loop and Nodal methods of circuit analysis.

Unit-III **8hrs**

Network Functions and Transient response: Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, Transient response, time domain analysis of simple RC, RL and RLC circuits, driving point and transfer function, Resonance in electrical circuits and stability from pole zero plot.

Unit-IV **8hrs**

Two Port Networks: Two port networks Z, Y, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & Π Representation.

Unit-V **10hrs**

(a) Network Synthesis : Hurwitz polynomials and Stability, 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.

(b) Filters: Image parameters and characteristics impedance, passive filter fundamentals, Realization of low pass,high-pass, (constant K type) filters using passive components.

Suggested Readings:

1. M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India
2. William H. Hayt& Jack E. Kemmerly Engineering Circuit Analysis McGraw-Hill Book Company Inc
3. A.Chakrabarti, "Circuit Theory" DhanpatRai& Co.
4. C.L Wadhwa, "Network Analysis and Synthesis" New Age International Publishers, 2007
6. D.RoyChoudhary, "Networks and Systems" Wiley Eastern Ltd
7. Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill

Course Code: TMA-310

Course Name: Advance Engineering Mathematics **L T P C**

3 1 0 4

Unit-I

Functions of Complex Variable: **9 hrs**

Analytic Function, Cauchy-Riemann Equations, Harmonic Functions. Power series, Taylor series and Laurent series. Conformal mapping, Bilinear Transformation.

Unit-II

Complex Integration: **9 hrs**

Cauchy Integral formula, Cauchy Integral theorem, Zeros, Singularities, Residues, Cauchy Residue Theorem, (Calculus of residues) Integrals of the type

$\int_0^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$, $\int_{-\infty}^{\infty} \frac{f(x)}{g(x)}\, dx$.

Unit-III **9 hrs**

Random Variable:

Discrete and Continuous, Probability mass and density Functions, Bayes' Theorem and its applications, Moments, Moment Generating Functions and their properties, Binomial , Poisson, Normal and Log-Normal Distributions, Probability of Error function.

Unit-IV **9 hrs**

Real number system, sets, relations and functions.Properties of real numbers.Sequences. Cauchy sequences. Sequences and series of functions.Pointwise and uniform convergence, Bolzano-Weierstrass and Heine-Borel properties.

Unit-V **9 hrs**

Functions of real variables.Limits, Continuity and differentiability.Reimann integral, Mean value theorems. Differentiation under integral sign.Improper integrals.

Suggested Readings:

1. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications,
2. Higher Engineering Mathematics by B.V. Ramanna (Tata-McGraw Hill)
3. Kreyszig, Erwin. "Advanced Engineering Mathematics", Wiley Publications,
4. Mattuck, A., Introduction to Analysis, Prentice-Hall.
5. Jain, R K; Iyengar, S R K; Advanced Engineering Mathematics, Narosa Publication

Course Code: TEC 303
Course Name: Signals & Systems **L T P C**
3 1 0 4

Unit-I **10hrs**

Signal: Definition, Types of signals and their Representation: continuous /discrete-time, periodic/ aperiodic, Even/odd, Energy/power, Deterministic/random, commonly used signals: unit impulse, Unit step, unit ramp, exponential, rectangular pulse, triangular pulse sinusoidal; operation on continuous –time and discrete time signals.

System: Classification of systems, discrete time LTI system: the convolution Sum; continuous –time LTI systems: the convolution integral, Singularity function.

Unit-II **10hrs**

Signal representation by Fourier series: Signal representation by orthogonal signal set, trigonometric Fourier series, convergence of the Fourier series, exponential Fourier series, properties of the continuous time Fourier series.

Continuous –time signal analysis Using Fourier transform : Aperiodic signal analysis by Fourier integral , convergence of the Fourier transform, transform of some useful functions, properties of the fourier transform ,signal transmission through LTIC systems, energy spectral density, power spectral density .

Unit-III **9hrs**

Continuous –time signal analysis Using the Laplace transform: Introduction, the Laplace transform, region of convergence for Laplace transform, transform of some useful function, properties of the Laplace transform, solution of differential equation using laplace transform ,the inverse Laplace transform.

Unit-IV **9hrs**

Discrete-time system analysis using the Z-transform: The Z-transform**,** the region of Convergence, transform of some useful function, properties of Z-transform ,z-transform solution of linear differential equation, Inverse z-transform, connection between the Laplace and the Z-transform.

Unit-V **7 hrs**

Sampling Theorem- Sampling and reconstruction of band limited signals. Low pass and band pass sampling theorems. Aliasing. Anti-aliasing filter, DTFS-DTFT

Suggested Readings:

1. B.P.Lathi , Signal processing & linear systems', Oxford Publication.
2. Oppenheim, A. V., Willsky A. S,' *Signals and Systems*' (2/e), Pearson.
3. HSU P.HWEI ,'Signal and system, Schaum outlines', McGraw hill.
4. Cheng,David k.,' *Analysis of linear systems'* , Narosa publishing house .
5. B.P Lathi, Signal & System, B.S.Publications, 2/e.
6. Simon Haykins, Signal & Systems, TMH publications(2/e)

Course Code: XCS -300

Course Name: Career Skills **L T P C**

2 0 0 2

Unit- I

Diagnostic Test of Grammar (followed by necessary action)

Unit- II

Diagnostic Test of Vocabulary (followed by necessary action),

Analogies, Odd One out, Group Discussion – I

Unit- III

Basics of Reading Comprehension Level -1 (using different types of passages for Practice)

Exercise : Elocution

Unit -IV

Creative Writing, Telephonic conversation and etiquette.

Unit -V

Basics of Personal Interview followed by Mock Interviews.

Suggested Readings:

1. Arun Sharma &MeenakshiUpadhyay(Quantitative Aptitude, Logical reasoning,Verbal Ability and Reading Comprehension)
2. Word Power Made Easy-Norman Lewis
3. Advanced English Grammar-Raymond Murphy(University of Cambridge Press)
4. Puzzles- George. J. Summers

Laboratories

PEE-301 Network Analysis and Synthesis Lab

L T P C
0 0 3 2

1. To experimentally verify the current divider rule (CDR) for parallel AC circuits and the voltage divider rule for series AC circuits.
2. To experimentally verify the superposition theorem in AC Circuits.
3. To experimentally verify the Thevenin and Norton Theorems in AC Circuits.
4. To experimentally verify the Maximum Power Transfer Theorem for AC circuits.
5. To study step response of second order RLC circuit.
6. To study frequency response of RC network.
7. To compute the power factor of passive circuit and verify the conservation of energy in sinusoidal steady state
8. Transient response in R-L and R-C Network: Simulation/hardware.
9. To study ABCD parameters of two port network.
10. Determination of Impedance (Z) , Admittance(Y) and hybrid (h) parameters of two port network
11. Foster's I &II form filter synthesis and analysis
12. Cauer's I &II form filter synthesis and analysis

PEC-302 Digital Electronics Lab

L T P C
0 0 3 2

1. To verify the truth table of logic gates and realization of AND, OR through diodes.
2. a. To verify the Boolean algebra function using digital IC gates (consensus theorem).
   b. To realize the function F (A, B, C, D) =(C+D) (A+B) (B+D) using NOR gates only
3. Design a half/full adder circuit
4. Design a half/full sub tractor circuit
5. Use Quine Mclusky method for designing F (A,B,C,D)= m(1,3,5,7,9,15)+d(4,6,12,13) realize it NOR-OR implementation.
6. Realization of Flip-flops using NAND gates.
7. Realization of shift registers using D flip-flops.
8. Design 4-bit Binary-Up counter.
9. Design 4-bit Binary-Down counter.
10. Design of ring Counter.

PEC-303 PCB and ORCAD Lab

L T P C
0 0 4 2

1. Identification and study of different types of electronic components.
2. To perform soldering and de-soldering of components on the PCB.
3. Design of Half Wave Rectifier circuit in ORCAD and create a layout and make PCB and do the testing of the PCB.
4. Design of Full Wave Center Tapped Rectifier circuit in ORCAD and create a layout and make PCB and do the testing of the PCB.
5. Design of Regulated Power Supply (5V) in ORCAD and create a layout and make PCB and do the testing of the PCB.
6. Designs of RC coupled amplifier circuit in ORCAD and create a layout and make PCB and do the testing of the PCB.

Semester-IV

Course Code: TEC 401
Course Name: Analog Electronics **L T P C**
3 1 0 4

Unit-I
Bipolar junction transistor **13hrs**
BJT circuits at DC,Q point, Bias stabilization, BJT as an amplifier and switch, biasing in BJT amplifier circuits, small signal models and analysis (CB, CE, CC). Multistage amplifier: RC coupled, Darlington pair, Cascode configuration. Frequency response of CE amplifier, calculation of cutoff frequency.

Unit-II
MOSFET **9hrs**
MOSFET circuits at DC, MOSFET as an amplifier and switch, biasing in MOSFET amplifier circuits, small signal models and analysis (CG, CS, CD).Frequency response of CS amplifier, calculation of cutoff frequency.

Unit-III
Differential amplifier (DA) **6hrs**
DA using BJT and MOSFET's, small signal analysis, DA with active load, Introduction to non-ideal characteristics of DA.

Unit-IV
Feedback and oscillators **8hrs**
General feedback structure, properties of negative feedback, four basic feedback topologies and their analysis.
Principle of sinusoidal oscillators, Types of oscillators: OPAMP RC phase shift, Weinbridge, Hartley, Collpits.

Unit-V
Power amplifiers **6 hrs**
Classification of power amplifiers, Operation and efficiency of: Series fed class A Transformer coupled class A, Class B push pull. Crossover distortion, methods to remove it.

Suggested readings:
1.S. Sedra and KC Smith, "Microelectronic Circuits", Oxford university press.5th edition.
2.Neaman A Donald, "Electronics circuits", TMH, 3rd edition.
3.MillmanHalkiyas, "Integrated electronics", TMH, 2nd edition.
4.Boylestad L Robert, "Electronic devices and circuit theory", Pearson, 9th edition
5. Jacob Millman and Arvin Grabel, "Microelectronics", TMH, 2nd edition

Course Code: TEC 402

Course Name: Microprocessor & its Applications **L T P C**

3 1 0 4

Unit-I

Introduction to microprocessors **6 hrs**

Introduction to Microprocessors: Evolution of Microprocessors, review of semiconductor memory organization, 8-bit Microprocessor (8085): Architecture and pin diagram

Unit-II

Programming with 8085 **10hrs**

Instruction set, addressing modes, assembly language programming*, Timing and control, peripheral I/O, memory mapped I/O, 8085 Interrupts, Stack and subroutines.

Unit-III

16 bit processor **12hrs**

16-bit Microprocessors (8086): Architecture, pin diagram Physical address, segmentation, memory organization, Bus cycle, Addressing modes, Assembly Language Programming of 8086, comparison of 8086 & 8088.

Unit-IV

Interfacing (data transfer) with microprocessor **7hrs**

Data Transfer Schemes: Introduction, handshaking signals, Types of transmission, 8255 (PPI), Keyboard-display controller (8279), Serial Data transfer (USART 8251), memory interfacing, 8257 (DMA), programmable interrupt Controller (8259).

Unit-V

Interfacing of microprocessor with timing devices **7hrs**

Programmable Interval Timer/ Counter (8253/8254): Introduction, modes, Interfacing of 8253, applications. Introduction to DAC & ADC, ADC & DAC Interfacing (0808 , 0809)

Note : Advanced sample programs like looping, Counting, modulo ten counter, time delay, wave form generation etc will be dealt in tutorials

Suggested Readings:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, Penram International Publication (India) Pvt. Ltd.
2. Douglas V. Hall, "Microprocessors and Interfacing", 2nd Edition, TMH, 2006.
3. R. Singh and B. P. Singh : Microprocessor Interfacing and Application, New Age International Publishers, 2nd Edition.
4. B.P. Singh and R. Singh : Advanced Microprocessor and Microcontrollers, New Age International Publishers, 2nd Edition.

Course Code: TEC 403
Course Name: Analog Communication **L T P C**
3 1 0 4

Unit – I
Mathematical Foundation of Communication **9hrs**
Spectral Density – Autocorrelation – Cross correlation – Transmission of signals through linear systems – Hilbert Transform – Pre envelope – Bandpass signals and systems – Phase and group delay – Random variables – Random process – Stationary – Mean, Correlation and covariance function – Time averages and periodicity- Transmission of Random processes through a linear filter – Gaussian process.

Unit – II
Amplitude Modulation **9hrs**
Amplitude modulation – Generation – Demodulation DSBSC generation and detection – Quadrate carrier multiplexing – SSB generation and detection – Vestigialsideband modulation – Frequency translation – Frequency Division Multiplexing.

Unit – III
Angle Modulation **9hrs**
Phase modulation and frequency modulation – Narrow band and wideband frequency modulation – Multi tone FM waves – Transmission bandwidth of FM waves – Generation and demodulation of FM waves – Response of linear filters to FM waves - Non linear effects in FM systems FM threshold effect – Preemphasis and deemphasis.

Unit – IV
Pulse Analog Modulation **8hrs**
Low pass sampling theorem – Bandpass sampling theorem – Sampling of bandpass signals- Practical aspect of sampling – TDM – pulse amplitude modulation – Pulse time modulation – spectra of pulse analog modulation system.

Unit – V
Noise in CW modulation **7hrs**
Noise – Narrowband noise – Envelope of sine wave plus SNR for coherent reception with DSBSC Modulation, SSB Modulation ,AM & FM receiver Noise in AM receivers using envelope
detection – Noise in FM reception - Noise in pulse modulation systems.

Suggested Readings
1. Simon Haykin, “Communication Systems”, Wiley Eastern, Fourth Edition, 2001.
2. Leon W. Couch II, “ Digital and Analog Communication Systems”, Prentice Hall, 1997
3. Sam Shanmugam, “Digital and Analog Communication Systems”, 2nd Edition, McGraw Hill, 1989.
4. B. Carlson, “Introduction to Communication systems”, 3rd, John Wiley, 1992.

Course Code: TEC 404

Course Name: Electromagnetic Field Theory **L T P C**

3 1 0 4

Unit-I **12hrs**

Review of Vectors, Gradient, divergence & Curl in Cartesian, cylindrical and Spherical polar co-ordinate System. Gauss Divergence and Strokes theorem.

Unit-II **12hrs**

Electrostatics.Coulomb's law.Gauss's law and applications.Electrostatic potential.Poisson's and Laplace equations.Method of images. Electrostatic fields in matter. Dielectrics and dielectric polarization. Boundary Conditions, Capacitors with dielectric substrates. Force and energy in dielectric systems.

Unit-III **6hrs**

Magnetostatics.Magnetic fields of steady currents. Biot-Savart's and Ampere's laws.Magnetic vector potential.Magnetic properties of matter, Electrodynamics. Flux rule for motional emf. Faraday's law.Boundary Condidtions, Self and mutual inductances.

Unit-IV **6hrs**

Maxwell's equations, displacement Current, Wave equations and its application, Boundary Conditions, pointing theorem.

Unit-V **10hrs**

Propagation of uniform plane waves in free space, loss less dielectric, Reflection and refraction, power flow in EM waves, Electromagnetic wave Wave polarization,

Suggested Readings:

1. Kraus,J.D.,' Electromagnetics with Applications' (5/e), TMH.
2. Jordan &Balman. 'Electromagnetic Waves & Radiating Systems,'(2/e), PHI.
3. Griffiths D.J., 'Introduction to Electrodynamics' (3/e), PHI.
4. Collin R.E.,' *Antennas and Radiowave Propagation'*, McGraw-Hill, 1985.
5. Mathew N.O.Sadiku, '*Elements of Electromagnetics'*, (4/e)Oxford University Press.
6. William Hayt,"Engineering Electromagnetics"(7/e), TMH publications.

Course Code: TCS 410

Course Name: Data Structures Using C **L T P C**

3 0 0 3

Unit –I **9 hrs**

Introduction: Basic Terminology, Pointer and dynamic memory allocation, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off Arrays**:** Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Array as Parameters, Ordered List, Sparse Matrices. Stacks:Array. Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion:Recursivedefinition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, tail recursion.

Unit-II **9 hrs**

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Dequeue, and Priority Queue.

Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list.

Unit-III **9 hrs**

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees, Huffman algorithm & Huffman tree.

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Unit-IV **9 hrs**

Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees.

Unit-V **9 hrs**

File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons, Graph, Traversal(DFS,BFS) ,Minimum spanning tree.

Suggested Readings:

1. Horowitz and Sahani, “Fundamentals of data Structures”, Galgotia
2. R. Kruse etal, “Data Structures and Program Design in C” Pearson Education

3. A M Tenenbaumetal, “Data Structures using C & C++”, PHI
4. Lipschutz, “Data Structure”, TMH
5. K Loudon, “Mastering Algorithms With C”, Shroff Publisher & Distributors
6. Bruno R Preiss, “Data Structures and Algorithms with Object Oriented Design Pattern in C++”, Jhon Wiley& Sons, Inc.

Course Code: XCS-400

Course Name: Career Skills **L T P C**

2 0 0 2

Unit -I

Arrangement based Questions (Linear, Circular, Vertical, Others), Tabular or Grid based Questions.

Unit- II

Blood Relations (Set based and single Questions), Grouping/Condition based problems.

Unit -III

Direction Sense, Coding Decoding, Series Completion(Alphabetic and Numerical).

Unit- IV

Syllogism, Visual Reasoning including Mirror/Water images, Mathematical Reasoning.

Unit- V

Cubes and Dice , Puzzles

Unit -VI

Data Interpretation part 1 (including Vedic Maths) and Data Sufficiency.

Suggested Readings:

1. Arun Sharma &MeenakshiUpadhyay(Quantitative Aptitude,Logicalreasoning,Verbal Ability and Reading Comprehension)
2. Word Power Made Easy-Norman Lewis
3. Advanced English Grammar-Raymond Murphy(University of Cambridge Press)
4. Puzzles- George. J. Summers

Laboratories

PEC-401 Analog Electronic Lab

L T P C
0 0 3 2

1. To study frequency response of single stage CE amplifier
2. Study of two stage RC coupled amplifier.
3. To study voltage gain and frequency response of FET amplifier.
4. To study power gain and frequency response of a transistor audio amplifier.
5. To study CLASS-B push pull power amplifier at audio frequency and observe the waveforms with and without crossover distortion..
6. To study and calculate the frequency of the RC phase shift Oscillator.
7. To study the frequency of a given crystal oscillator and measure the output.
8. To study WEIN-BRIDGE oscillator and determine its frequency.
9. To study series and parallel resonance.
10. To study the HARTLEY and COLPITS oscillator.

PEC-402 Microprocessor Lab

L T P C
0 0 3 2

Part A- Study based experiment based on 8085 and 8086.

I. To perform Data Transfer operation on given no's.
   1. To swap two no's stored in different memory location.
   2. To swap block of data from one contiguous memory location to other contiguous memory location.

II. To perform Arithmetic and Logical operation on given numbers
   3. Program to add two 8 bit numbers.
   4. Program to subtract two 8 bit no's with and without borrow
   5. Program to add 10 numbers stored in contiguous memory location.
   6. Program to add two 16 bit numbers.
   7. Program to perform addition of BCD numbers.
   8. Program to find multiplication of two 8 bit numbers.
   9. Program to perform division operation on two 8 bit numbers.
   10. Program to find 1's, 2's complement of two numbers.

III. Miscellaneous programs
   11. Program to find square/square root of a number using look up table.
   12. Program to find largest no. from an array of no's.
   13. Program to find smallest no. from an array of no's.
   14. Program to arrange series of numbers in ascending order.
   15. Program to arrange series of numbers in descending order.
   16. Program to multiply or divide a no. by 2^n using RLC and RRC instruction

Part B - INTERFACING based experiment based on 8085 and 8086

17. To obtain interfacing of Programmable Peripheral Interface 8255.
18. To perform microprocessor based stepper motor operation.
19. To perform microprocessor based traffic light control program.
20. To obtain interfacing of Keyboard controller 8279.
21. To obtain interfacing of Analog to Digital Converter (ADC)
22. To obtain the 7 segment display of a BCD number.

PCS-410 Data Structure Lab

L T P C
0 0 4 2

Write Program in C or C++ for following. **(ALL)**

1. Array implementation of Stack, Queue, Circular Queue, List.
2. Implementation of Stack, Queue, Circular Queue, List using Dynamic memory Allocation.
3. Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.
4. Implementation of Searching and Sorting Algorithms.
5. Graph Implementation, BFS, DFS, Min. cost spanning tree, shortest path algorithm

   *Additional experiments as instructed by subject teacher.

PEC-403Analog Communication Lab

L T P C
0 0 3 2

1. To study amplitude modulation and demodulation and determine depth of modulation.
2. Generation of DSB-SC signal using balanced modulator.
3. Generation of single side band.
4. To study frequency modulation using voltage controlled oscillator.
5. Study of phase lock loop and detection of FM Signal using PLL.
6. Study of super heterodyne AM receiver.
7. Study of pulse amplitude modulation and demodulation.
8. Simulation of AM using M file program and Simulink diagram in MATLAB.
9. Simulation of FM using M file program and Simulink diagram in MATLAB.
10. Simulation of PM using M file program and Simulink diagram in MATLAB

Semester-V

Course Code :TEC-501 **L T P C**
Course Name: Digital Communication **3 1 0 4**

Unit-I **9 hrs**

Sampling And Waveform Coding:

Sampling Theorem, Band pass sampling, distortion due to sampling, uniform and non uniform Quantization, Quantization error, PAM, PCM and TDMA Principles, Differential pulse code Modulation and Delta Modulation, linear prediction and prediction filters, speech coding at low bit rates.

Unit-II **9 hrs**

Band limited Signalling:

Power Spectra of PAM signals, Inter symbol InCourseCode : Interference, ideal Nyquist channel, raised cosine channels, correlative coding and precoding, eye patterns and equalization techniques.

Unit-III **9 hrs**

Digital Modulation, Detection And Estimation:

Gram Schmidt procedures, matched filters, correlation receivers, likelihood functions and maximum likelihood detection, BPSK, QPSK, FSK and MSK schemes bit and symbol error properties, performance comparisons, principles of carrier and timing synchronization.

Unit-IV **9 hrs**

Information Theory :

Information Measure; Entropy and Information rate; Discrete Memoryless source; Shannon-Fano coding, Huffman coding; Mutual Information; Binary symmetric channel, Discrete channel capacity; Continuous information source; Continuous channel capacity, Channel capacity theorem.

Unit-V **9 hrs**

Error Control Coding:

Introduction to linear block codes, Hamming codes, BCH coding, RS coding, Convolutional Coding, Coding Grain Viterbi decoding.

Suggested Readings:

1. Simon Haykins, “Digital Communications”, John Wiley, 1988.
2. John.g.Proakis, ‘Digital Communication’, McGraw-Hill Inc., Third edition, Malaysia, 1995.
3. M.K.Simen, ‘Digital Communication Techniques, Signal Design & Detection’, Prentice Hall of India, 1999

Course Code: TEC 502
Course Name: Microcontroller **L T P C**
3 0 0 3

Unit-I **8 hrs**

Introduction , Microcontrollers and Embedded processors, Overview of the 8051, Inside the 8051, Addressing modes.

Unit-II **10hrs**

Introduction to 8051 assembly programming, Assembling and running an 8051 program, The program counter and ROM space in the 8051, 8051 data types and directives, 8051 flag bits and the PSW register, 8051 register banks and stack, 8051 I/O programming, I/O bit manipulation programming.

Unit-III **10 hrs**

Programming the 8051 timers, Counter programming, Basics of serial communications, 8051 connection to RS-232, 8051 serial port programming assembly, 8051 interrupts, Programming timer interrupts, programming external hardware interrupts, programming the Serial communication interrupts, Interrupts priority in the 8051.

Unit-IV **8 hrs**

Interfacing with 8051: Memory address decoding 8031/ 51 interfacing with external ROM, 8051 data memory space, LCD, Keyboard, Parallel and Serial ADC, DAC interfacing, Sensor interfacing and Signal Conditioning, Stepper motor and DC motor.

Unit-V **8 hrs**

Programming the 8255 and Interfacing, Introduction to Intel 8096 and MC68HC11 microcontroller.

Suggested Readings:

1. Mazidi Ali Muhammad, MazidiGillispie Janice, and McKinlayRolin D., " The 8051 Microcontroller and Embedded Systems using Assembly and C", Pearson, 2nd Edition.
2. ChhabraBhupendra Singh, "Microcontrollers & its Applications" DhanpatRai Publishing Company
3. Ayala Kenneth, "The 8051 Microcontroller", Cengage Learning, 3rd Edition
4. Shah Satish, " 8051 Microcontrollers MCS 51 Family and its variants", Oxford
5. GhoshalSubrata, " 8051 Microcontroller Internals, Instructions, Programming and Interfacing" Pearson

Course Code: TEC 503
Course Name: Control Systems **L T P C**
3 1 0 4

Unit-I
System and it's Modelling **9 hrs**
Classification of systems: Linear/Nonlinear, Time variant/invariant, Continuous time/discrete time. Transfer function, Open loop – closed loop system and sensitivity, Block diagrams representation and its reduction, signal flow graph, Masons gain formula and its application to block diagrams, Review of Laplace transform, System modelling: Mechanical- Translational & Rotational, Electrical- series RLC, Electromechanical- DC servo motor.

Unit-II
Time Response and Steady State Error Analysis **11 hrs**
First order and second order system: Impulse, Unit step & Ramp input response and analysis, steady state error. Static error coefficients: K_P, K_V, K_a, Performance indices and computation of ISE, Control actions: P, PI, PD & PID controllers and analysis.

Unit-III
Frequency response and stability analysis **10 hrs**
Routh Hurwitz criterion, Nyquist plot: Stability, Gain and Phase margin, Gain Phase plot, M-N circles. Bode plot: Stability, Gain and Phase margin, Correlation between time and frequency response. Root locus plot for stability analysis.

Unit-IV
Design and compensation techniques **6 hrs**
Design considerations, Electronic lag-lead compensator, PD control as lead compensator, PI control as lag compensator, Lag-Lead compensation based on root locus approach.

Unit-V
State Variable Analysis **6 hrs**
State space representation of Continuous Time systems (LTI), State equations, Transfer function from State Variable Representation, Solutions of the state equations, Concepts of Controllability and Observability.

Suggested Readings

1. Ogata Katsuhiko, "Modern Control Engineering", PHI, th edition.
2.Nagrath I. J. &Gopal M., "Control System Engineering", New Age International Publishers.
3. Kuo B. C. , "Automatic Control Systems", PHI.
4. Nise S. Norman, "Control System Engineering" John Wiley & Sons, Singapore.

Course Code: TEC 504
Course Name: Antenna & Wave Propagation **L T P C**
3 1 0 4

Unit-I **8 hrs**
Radiation fundamentals.Potential theory.Helmholtz integrals.Radiation from a current element.Basic antenna parameters.Radiation field of an arbitrary current distribution.Small loop antennas.

Unit-II **8 hrs**
Receiving antenna.Reciprocity relations.Receiving cross section, and its relation to gain.Reception of completely polarized waves.Linear antennas.Current distribution.Radiation field of a thin dipole.Folded dipole.Feeding methods.Radiation from helical antenna.

Unit-III **8 hrs**
Antenna arrays.Array factorization.Array parameters. Broad side and end fire arrays. Yagi-Uda arrays Log-periodic arrays.

Unit-IV **8 hrs**
Aperture antennas.Fields as sources of radiation.Horn antennas.Babinet's principle.Parabolic reflector antenna. Feeding systems, Microstrip antennas,

Unit-V **12hrs**
Wave Propagation: Propagation in free space.Propagation around the earth, surface wave propagation, structure of the ionosphere, propagation of plane waves in ionized medium, Determination of critical frequency, MUF. Fading, tropospheric propagation, Super refraction.

Suggested Readings:

1. J.D.Kraus, Antennas (3/e), TMH.
2. Balanis. Antenna analysis & Design, John Wiley.
3. R.E.Collin, Antennas and Radio Wave Propagation, McGraw – Hill,1985.
4. K.F.Lee, Principles of Antenna Theory, Wiley,1984.
5. J.R. James etal, Microstrip Antenna Theory and Design, IEE, 1981.
6. Frederick Emmons Terman, Electronic Radio Engineering (4/e), McGraw Hill

Course Code: TEC 505
Course Name: Linear integrated circuits **L T P C**
3 1 0 4

Unit-I
IC OPAMP and its applications **12hrs**
Block diagram of OPAMP, Differential amplifier (DA) and its configurations, DC and AC analysis of DA, current mirror circuit, widlar current source, DA with active load, level shifter, O/P stage of OPAMP, IC 741,DC and AC characteristics of OPAMP, Ideal and practical inverting and non-inverting amplifier, adder, subtractor, integrator and differentiator (ideal and practical), Instrumentation amplifier, VCVS, VCCS, CCVS, CCCS.

Unit-II
Nonlinear circuits **8 hrs**
Log/ Antilog amplifiers and modules, Precision rectifiers, Peak detector, sample and hold circuit, OPAMP as comparator, Schmitt trigger, Square and triangular wave generator, Monostable multivibrator, IC Analog multiplier applications.

Unit-III
Active filters **7 hrs**
Introduction to filtering: Frequency response, characteristics and terminology, active versus passive filters. Low pass filter: First and second order butterworth filter. High pass filter: First and second order butterworth active filter. Band pass filter: Narrow band and Wide band. Band reject filter: Narrow band and wideband. All pass filter.

Unit-IV
IC 555, PLL, OTA **6 hrs**
IC 555 timer circuitry and its applications, PLL, OTA

Unit-V
Voltage regulators **9 hrs**
OPAMP regulators, IC regulators, Fixed voltage regulators (78/79, XX), SMPS, 723 regulator.

Suggested readings:
1.Salivahanan S, “Linear integrated circuits”, McGraw Hill, 10th edition
2.Chodhary DR, “Linear integrated circuits”, New age international, 2nd edition
3.Gayakwad RA, “OPAMP and linear integrated circuits”, PHI New delhi, 2nd edition

Course Code: XCS-500
Course Name: Career Skills **L T P C**
2 0 0 2

Unit-I

Diagnostic Test of Reading Comprehension and Reading Comprehension (Advanced Level)

Unit-II

Assertion-Reason, Statement-Assumption, Statement-Conclusion, Critical reasoning.

Unit-III

Para jumbles, Paragraph Completion, Advanced level Grammar.

Unit-IV

Extempore, Group Discussion – II (Practice Sessions)

Unit-V

Role Plays and Mock Interviews (Mocks)

Suggested Readings:

1. Arun Sharma &MeenakshiUpadhyay(Quantitative Aptitude,Logicalreasoning,Verbal Ability and Reading Comprehension)
2. Word Power Made Easy-Norman Lewis
3. Advanced English Grammar-Raymond Murphy(University of Cambridge Press)
4. Puzzles- George. J. Summers

Laboratories

PEC-501 Digital Communication Lab **L T P C**
0 0 3 2

1. Study of Sampling and reconstruction techniques.
2. Study of Pulse code modulation and demodulation
3. Study of delta modulation and demodulation and observe effect of slope overload DCL-07.
4. Study of Adaptive Delta modulation and demodulation
5. Study of data coding techniques.
6. Study of amplitude shift keying modulator and demodulator.
7. Study of frequency shift keying modulator and demodulator.
8. Study of phase shift keying modulator and demodulator.
9. Study of TDM PCM Transmitter and receiver.
10. Simulation using MATLAB (Digital modulation and demodulation techniques)

PEC-502 Microcontroller Lab

L T P C
0 0 3 2

1. Write a program of Flashing LED connected to port 1 of the Micro Controller
2. Write a program to show the use of INT0 and INT1.
3. Write a program to generate 10 kHz square wave.
4. Write a program to generate 10 kHz frequency using interrupts.
5. Write a program for temperature & to display on intelligent LCD display
6. Write a program to demonstrate the polling of Interrupt of 8051/8031 micro controllers.
7. Write a program to generate a Ramp waveform using DAC with micro controller.
8. Write a program to control a stepper motor in direction, speed and number of steps.
9. Write a program to control the speed of DC motor.
10. Write a program to interface Microcontroller with 8255.

PEC-503 Control Systems Lab using MATLAB

L T P C
0 0 3 2

1. Design open loop and closed loop systems and calculate gain and sensitivity.
2. Study of first order and second order system response to Impulse, Unit step & Ramp input.
3. Plotting Bode Nyquistdiagrams and calculate gain and phase margin.
4. Plotting Root loci diagrams calculate gain and phase margin.

5. Design of Electromechanical- DC servo motor using Simulink.
6. Design a lag compensator and to obtain the characteristics by simulation.
7. Design a lead compensator and to obtain the characteristics by simulation.
8. Design a lead-lag compensator and to obtain the characteristics by simulation.
9. Design P, PI, PD and PID controllers for conceptual systems and simulate the closed loop system.
10. Study of LTI system using state space equations.

PEC-504 Linear Integrated Circuits Lab

L T P C
0 0 3 2

1. To verify the function of op-amp as an inverting and non-inverting amplifier for both AC and DC inputs.
2. To verify the function of op-amp as a summer (AC and DC inputs)
3. To verify the function of op-amp as a subtractor (AC and DC inputs).
4. To perform the mathematical operation of integration using practical circuits of op-amp.
5. To perform the mathematical operation of differentiation using practical circuits of op-amp.
6. To study half wave and full wave rectifier circuits using op-amp.
7. To study the performance of logarithmic amplifier.
8. To design a square wave and triangular wave generator using Op-amp's.
9. To design a second order butter worth low pass filter for cut of frequency of 2 KHz and determining its frequency response.
10. To study the frequency response of a high pass filter (second order).
11. To plot the frequency response of the band pass filter for a specified frequency range.
12. To study applications monostable and astable operations of 555 timer IC.

Semester-VI

Course Code: TEC-601

Course Name: Electronic Measurement & Instrumentation **L T P C**

3 0 0 3

Unit-I **10hrs**

Theory of Measurement:

Introduction, Performance Characteristics: static & dynamic standards, Error analysis: Sources, types and statistical analysis.

Passive transducers: Resistive, Inductive and Capacitive

Active transducer: Thermo-electric, piezoelectric & photoelectric.

Unit -II **8hrs**

Analog Meters: AC analog meters: Average, Peak and RMS responding voltmeters.

Electronics Analog meters: Electronics analog AC voltmeters and ammeters, ohmmeter and multimeter.

Unit -III **8hrs**

Converters: Analog to digital converter; Transfer characteristics

A/D Conversion techniques: successive approximation, ramp type, integrating & dual-slope integrating method.

D/A Conversion techniques: weighted resistor, R-2R ladder method.

Unit -IV **8hrs**

DC AND AC Bridges: Measurement of R.L.C., Wheat-stone bridge, Shearing bridge, Hay's bridge, De-Sauty's, Maxwell bridge.

Display devices: Decimal, BCD to seven segment display, numeric & alpha number display.

Unit –V **10hrs**

Oscilloscope: Block diagram, cathode ray tube, controls, Measurements voltage, frequency, time & Phase, Lissajous figures. **Signal Generators:** Sine wave, non-sinusoidal & function generators. **Signal Analyzers:** Harmonic and Spectrum Analyzers.

Suggested Readings:

1. Kalsi H.S., ' *Electronics Instrumentation*', TMH Ed. 2004.
2. Anand, MMS.,'Electronic Instruments & Instrumentation Technology', PHI Pvt. Ltd., New Delhi Ed. 2005.
3. Cooper W.D. &Helfrick A.D. 'Electronics Instrumentation & Measurement Techniques', PHI 3rd Ed.
4. Oliver, Cage., '*Electronic Measurement & Instrumentation*', Tata Mc-Graw Hill.

Course Code :TEC-602 **L T P C**
Course Name :Microwave Engineering **3 1 0 4**

Unit-I **8 hrs**

Microwave Sources: Klystron, Reflex Klystron, Magnetron, TWT, Gunn Diode, IMPATT, TRAPATT,Tunnel Diode –Operation & Characteristics

Unit-II **12hrs**

Rectangular & Circular Waveguides

Transverse magnetic waves in rectangular wave guides – Transverse electric waves in rectangular waveguides – Characteristics of TE and TM waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE and TM modes in rectangular waveguide – Wave impedance – Characteristic impedance – Excitation of modes.

Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – Wave impedances and characteristic impedance – Dominant mode in circular waveguide – Excitation of modes

Cavity Resonators

Microwave cavities – Rectangular cavity resonators – Circular cavity resonator – Semicircular cavity resonator – Q factor of a cavity resonator.

Unit-III **8 hrs**

Theory of transmission lines – transmission line equations, SWR, reflection coefficient, transmission coefficient, transmission lines as circuit element, impedance matching, Stub matching using smith chart.

Unit-IV **7 hrs**

Microwave network analysis- S, ABCD, T, Z, Evaluation of N/W parameters & their inter relationship parameters.

Measurement and characterization of microwave networks, return loss, insertion loss, dielectric constant measurement, SWR, reflection co-efficient, frequency and guided wavelength, Network analyzer.

Unit-V **10hrs**

Passive microwave devices; terminations, bends, corners, attenuators, phase changers, directional couplers and hybrid junctions.Ferrite devices.Design and realization of MIC components.3 dB hybrid design. Directional coupler, circulator, power divider; realization using microstrip lines, microwave filters by insertion loss method.

Suggested Readings:

1. D.M.Pozar, Microwave Engineering (2/e), Wiley,1999.
2. R.E.Collins, Foundations of Microwave Engineering, IEEE Press.
3. I.J.Bhal&P.Bhartia, Microwave Solid state Circuit Design, Wiley.
4. Samuel Liao,"Microwave Devices &Circuits",PHI.

Course Code :TEC-603 **L T P C**
Course Name : VLSI Technology& Design **3 1 0 4**

Unit-I **8 hrs**

VLSI technology- NMOS, CMOS and BICMOS circuit fabrication.Layout design rules. Stick diagram. Latch up.

Unit-II **8 hrs**

System design using HDL- circuit and system representation.Hierarchical representation of digital system.An overview of Verilog.Basics of verilog, operators, hierarchy, procedures and assignments. Timing controls, delay, tasks and functions. Control statements. Test benches.

Unit-III **10hrs**

VLSI logic circuits and analysis- MOS and CMOS switches.Implementation of logic circuits using MOS and CMOS technology, multiplexers and memory, MOS transistors, threshold voltage, MOS device design equations. MOS models, small-signal AC analysis. CMOS inverters, propagation delay of inverters, power dissipation.

Unit-IV **8 hrs**

Programmable logic devices- antifuse, EPROM and SRAM techniques. Programmable logic cells. Programmable inversion and expander logic. Design flow for VLSI circuits. Computation of interconnect delay.

Unit-V **8 hrs**

VLSI testing -need for testing , manufacturing test principles, design strategies for test, chip level and system level test techniques.

Suggested Readings:

1. N.H.E.Weste etal, CMOS VLSI design, (3/e), Pearson , 2005
2. J. Smith, Application Specific Integrated Circuits, Addison Wesley, 1997.
3. Uyemura, Introduction to VLSI Circuits and Systems, Wiley, 2002.

Course Code :TEC-604

Course Name: Digital Signal Processing **L T P C**

3 1 0 4

Unit-I **10hrs**

Discrete Fourier Transform: Frequency Domain Sampling: The Discrete Fourier Transform Frequency Domain Sampling and Reconstruction of Discrete-Time Signals. The
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.Frequency analysis of signals using the DFT. Introduction to MATLAB. (Coding of Implementation of LTI using DFT)

Unit-II **8 hrs**

Efficient Computation of DFT: 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 2N-Point real sequences.
(Coding of FFT algorithms)

Unit-III **8 hrs**

Filter Structures: Direct form (I & II), LATTICE for FIR & IIR Filters.

Unit-IV **9 hrs**

Design of Digital IIR Filters: Impulse invariant and bilinear transformation techniques for Butterworth and chebyshev filters; cascade and parallel. (Coding of Butterworth and chebyshev filters)
Design of FIR Filters:- windowing, optimum approximation of FIR filters, multistage approach to sampling rate concession. Design of Hilbert transforms. (Coding of windowing for
FIR Filters)

Unit-V **9 hrs**

Adaptive Wiener Filter And Lms Algorithm: Application of adaptive filtering to echo cancellation and equalization.
Application of DSP And Coding: Audio and Video coding, MPEG coding standardization, DCT, Walsh and Hardmard Coding.

Suggested Readings:

1. Proakis, J.G. &Manolakis, D.G., “Digital Signal Processing: Principles Algorithms and Applications”, Prentice Hall (India).
2. Apte, “ Digital Signal Processing”, 2nd Edition, John Wiley (India),2009.
3. Rabiner, L.R. and Gold B., “Theory and applications of DSP”, PHI.
4. Thomas J, Cavichhhi, “Digital Signal Processing”, John Wiley & Sons
5. Roman KUC, Digital Signal Processing, BSP Hyderabad

Course Code: XCS-600

Course Name: Career Skills **L T P C**

2 0 0 2

Unit-I

Fundamentals of Numbers, LCM, HCF, Simplification(operations on numbers,BODMAS,divisibility rules, formula based questions, problem sums)decimal fractions, Series(Arithmetic progression, geometric progression, Harmonic Progression), Surds-Indices, Remainders, Concept of last digit, Alpha numerals, Percentage.

Unit-II

Profit, Loss, Discount, Simple Interest, Compound Interest, Ratio-Proportion.

Unit-III

Averages, Ages, Mixtures and solutions.

Unit-IV

Time, Speed and Distance including Trains, Boats and Streams, Time and Work.

Unit -V

Permutation Combination , Probability.

Unit -VI

Set Theory, Clocks, Calendar, Logarithms, Mensuration

Suggested Readings:

1. Arun Sharma &MeenakshiUpadhyay(Quantitative Aptitude,Logicalreasoning,Verbal Ability and Reading Comprehension)
2. Word Power Made Easy-Norman Lewis
3. Advanced English Grammar-Raymond Murphy(University of Cambridge Press)
4. Puzzles- George. J. Summers

Open Electives

Course Code:TOE-601

Course Name Object Oriented Programming

L	T	P	C
3	0	0	3

Unit-I **9 hrs**

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism. Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions - static members – Objects – pointers and objects – constant objects – nested classes – local classes

Unit-II **9 hrs**

Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion – explicit constructor

Unit-III **9 hrs**

Function and class templates - Exception handling – try-catch-throw paradigm – exception specification – terminate and Unexpected functions – Uncaught exception.

Unit-IV **9 hrs**

Inheritance – public, private, and protected derivations – multiple inheritance – virtual base class – abstract class – composite objects Runtime polymorphism – virtual functions – pure virtual functions – RTTI – typeid – dynamic casting – RTTI and templates – cross casting – down casting .

Unit-V **9 hrs**

Streams and formatted I/O – I/O manipulators - file handling – random access – object serialization – namespaces - std namespace – ANSI String Objects – standard template library.

Suggested Readings:

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.
2. Ira Pohl, “Object Oriented Programming using C++”, 2nd Edition, Pearson Education, Reprint 2004.
3. S. B. Lippman, JoseeLajoie, Barbara E. Moo, “C++ Primer”, 4th Edition, Pearson Education, 2005.
4. B. Stroustrup, “The C++ Programming Language”, 3rd Edition, Pearson Education, 2004.
5. Herbert Schildt, “C++: The Complete Reference”, TMH, 2006

Course Code :TOE-602

Course Name: Advanced Control System

L	T	P	C
3	0	0	3

Unit-I **9 hrs**

Sampling and Signal Conversion: Sampled-Data Control Systems, Digital to Analog Conversion,
Sample and Hold operations, Sample and Hold Devices, frequency–Domain Characteristic of Zero order Hold.
The Z-Transform: Linear Difference equations, The Pulse Response, The Definition of the Z-transform, Relationship between the Laplace transform and the Z-transform, Relationship between S-plane and the Z plane, The constant-Damping Loci, The constant- Frequency
Loci, The constant-Damping Ratio Loci, The Inverse Z Transform, Theorems of the Z-transform, Limitations of the Z transform, Application of the Z-transform ,Stability Analysis, Systems with Dead-Time.

Unit-II **9 hrs**

Transfer Functions, Block Diagrams, and Signal flow Graphs The Pulse Transfer Function and The Z-Transfer Function, The Pulse Transfer Function of the Zero-Order Hold and the
Relation Between G(s) and G(z), Closed loop systems, The Sampled Signal flow Graph, The Modified Z-transfer function, Multirate Discrete Data System. Transform Design of Digital
Controls Design of position Servo Design Specifications, Design on the W- plane, Design of the W-plane, the Digital PID Controllers.

Unit-III **9 hrs**

State Space Analysis of Sampled Data Systems Discrete time state equations.Similarity Transformations, The Cayley-Hamilton Theorem, Realization of Pulse Transfer function, State Equations for sampled Data Systems, Concepts of Controllability and Observability, Liapunov Stability Analysis Systems with Dead time.

Unit-IV **9 hrs**

Design of digital controls using State Space analysis Formulation of the optimal control Problem Optimal State Regulator, Use of State Regulator results, Eigen value Assignment by State feedback, State observers Stochastic optimal State Estimation.

Unit-V **9 hrs**

Mechanization of Control algorithms Using Micro Processors General Description of Microcontrollers, Digital quantization, Microprocessor based Position Control System

Suggested Readings:

1. M. Gopal, “Digital Control Engineering”, New Age International Publishers.
2. B.C. Kuo ,“Digital Control Systems”, Oxford University Press.

Course Code :TOE-603 **L T P C**

Course Name: Computer Architecture **3 0 0 3**

Unit-I **9 hrs**

Introduction:

Computing and Computers, evolution of computers, VLSI era, system design- register level, processor level, CPU organization, Data representation, fixed – point numbers, floating point numbers, instruction formats, instruction types.

Unit-II **9 hrs**

Data Path Design:

Fixed point arithmetic, addition, subtraction, multiplication and division, combinational and sequential ALUs, carry look ahead adder, Robertson algorithm, booth's algorithm, non-restoring division algorithm, floating point arithmetic, coprocessor, pipeline processing, pipeline design, modified booth's algorithm

Unit-III **9 hrs**

Control Design:

Hardwired Control, micro programmed control, Multiplier control unit, CPU control unit, Pipeline control, instruction pipelines, pipeline performance, super scaling processing, Nano programming.

Unit-IV **9 hrs**

Memory Organization:

Random access memories, serial access memories, RAM interfaces, magnetic surface recording, optical memories, multilevel memories, Cache & virtual memory, memory allocation, Associative memory.

Unit-V **9 hrs**

System Organization:

Communication methods, buses, bus control, bus interfacing, bus arbitration, IO and system control, IO interface circuits, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance.

Suggested Readings:

1. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.
2. John P.Hayes, 'Computer architecture and organisation', Tata McGraw-Hill, Third edition, 1998.
3. V.CarlHamacher, Zvonko G. Varanesic and Safat G. Zaky, " Computer Organisation " IV edition, McGraw-Hill Inc, 1996.
4. H.S. Stone, "High Performance computer architecture", Addison Wesley, Third Edition, 1993.

Course Code :TOE-604 **L T P C**

Course Name: Operating System **3 0 0 3**

Unit-I **6hrs**

Introduction to Operating Systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot.

Unit-II **10hrs**

Process Management: Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling.

Process Synchronization : Synchronization: The Critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.

Unit-III **10hrs**

Deadlocks: Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

Memory Management: Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

Unit-IV **10 hrs**

File System, Implementation of File System: File System:File concept; Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management

Secondary Storage Structures, Protection : Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of

protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights

Unit-V **6 hrs**

Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory management; File systems, Input and output; Inter-process communication.

Suggested Readings:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 7th edition, Wiley India, 2006.
2. William Stallings: Operating Systems: Internals and Design Principles, 6th edition, Pearson, 2009
3. Andrew S Tanenbaum: Operating Systems: Design and Implementation, 3rd edition, Prentice Hall, 2006
4. Stuart E. Madnick, John Donovan: Operating Systems, Tata McGraw Hill, 2008

Laboratories (All Experiments)

PEC-601 Microwave Engineering Lab

L	T	P	C
0	0	3	2

1. Measurement of guide wavelength and frequency of the signal in a rectangular waveguide.
2. Measurement of VSWR using slotted line.
3. Study of mode characteristics of reflex Klystron and determination of mode number, transit time & electronic tuning sensitivity.
4. Study of characteristics of Gunn oscillator.
5. Study of Gunn diode as modulated source (PIN modulation) and determination of modulation depth.
6. Measurement of coupling coefficient and directivity of a directional coupler.
7. Study of insertion loss & coupling coefficient of TEE's.
8. Measurement of attenuation using substitution method and plot of attenuation versus frequency characteristics.
9. Study of waveguide horn and its radiation pattern and determination of the beam width.
10. Measurement of microwave power using power meter
11. Study the characteristics of microwave filter(LPF &BPF)

PEC-602 VLSI Design Lab

L	T	P	C
0	0	3	2

Following Experiments are to be implemented in VHDL
Experiments on Xilinx FPGA

1. Adders (half and full adder)
2. Comparators
3. Flip flops and Latches
4. Counters
5. Encoder and decoder
6. Shift registers
7. PN Sequence
8. System design and implementation in FPGA

PEC-603 Digital Signal Processing Lab Using MATLAB

L	T	P	C
0	0	3	2

1. Basics of MATLAB-Realisation of Unit Impulse, Unit Step, Unit Ramp signals. Sinc&Signum functions, sine & cosine sequences, exponential sequence.
2. Linear & Circular Convolution of two Sequences.
3. Correlation of two sequences
4. DFT & IDFT Computation
5. Radix-2 FFT algorithme
6. Génération of Gaussiandistributednumbers
7. Design and simulation of IIR filtre.
8. Design and simulation of FIR filtre

Note:

Additional 6 experiments can be given by the concerned subject teacher.

SEMESTER VII

Course Code :TEC-701 **L T P C**

Course Name: Telecommunication Switching **3 0 0 3**

Unit-I **9 hrs**

Evolution Of Telecommunication Switching And Circuits

Evolution of Public Switched Telecommunication Networks Strowger exchange, Crossbar exchange, Stored programme exchange Digital exchange – Basic Tele communication equipments – Telephone handset, Hrbrid circuit, Echo suppressors and cancellors, PCM coders, Modems and Relays.

Unit-II **9 hrs**

Electronic Switching

Circuit Switching, Message switching, Centralized stored programme switching, Time switching, Spare switching, Combination switching – Digital switching system hardware configuration, Switching system software, Organization, Switching system call processing software, Hardware software integration.

Unit-III **9 hrs**

Telecommunication Signalling And Traffic

Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, Concept of Telecommunication traffic, Grade of service, Modeling switching systems, Blocking models and Delay systems.

Unit-IV **9 hrs**

Integrated Digital Networks

Subscriber loop characteristics, Local access wire line and wire less PCM / TDM carrier standards transmission line codes, Digital multiplexing techniques, Synchronous, Asynchronous, Plesiocronous multiplexing techniques, SONET / SDH, Integrated Digital Network (IDN) environment – Principles of Integrated Services Digital Network (ISDN) – Cellular Mobile Communication Principles.

Unit-V **9 hrs**

Data Net Works

Data transmission in PSTN – Connection oriented and Connection less protocols – packet switching – ISO-OSI architecture-Satellite based data networks – Multiple access techniques – LAN, WAN – standards – TCP / IP – Internet – Principle of ATM networks.

Suggested Readings:

1. Viswanathan. T, “Telecommunication Switching System and Networks”, Prentice Hall of India Ltd., 1994.

2. BehrouzForouzan, “Introduction to Data Communication and Networking”, McGraw-Hill, 1998.
3. L.S.Lawton, “Integrated Digital Networks, Galgotta Publication Pvt., Ltd., New Delhi, 1996.
4. Syed R. Ali, “Digital Switching Systems”, McGraw-Hill Inc., New York, 1998.

Course Code :TEC-702 **L T P C**

Course Name: Optical Communication **3 0 0 3**

Unit-I **9hrs**

Introduction: Block diagram of optical fiber communication system, Advantages of optical fiber communication

Optical fiber waveguides: **S**tructure of optical wave guide, light propagation in optical fiber using ray theory, acceptance angle, numerical aperture, skew rays, wave theory for optical propagation, modes in a planar and cylindrical guide, mode volume, single mode fibers, cutoff wavelength, mode field diameter, effective refractive index and group and mode delay factor for single mode fiber.

Unit-II **8hrs**

Attenuation in optical fibers, intrinsic and extrinsic absorption, linear and non linear scattering losses, fiber bend losses. Dispersion and pulse broadening, intramodal and intermodal dispersion for step and graded index fibers, modal noise, over all fiber dispersion for multimode and monomodefiber, dispersion shifted fibers, modal birefringence and polarization maintaining fibers.

Unit-III **8 hrs**

Optical Sources: Basic concepts Einstein relations and population inversion optical feedback and threshold conditions, direct and indirect band gap semiconductors spontaneous and stimulated emission in p-n junction, threshold current density, Hetero junction & DH structure, semiconductor injection lasers structure & Characteristics of injection laser. Drawback and advantages of LED, DH, LED, LED structures and Characteristics.

Unit-IV **7 hrs**

Optical detectors: Requirement for photo detections p-n photodiode, characteristics of photo detections, p-i-n and avalanche photodiodes, phototransistors & photoconductors.

Direct detection receiver performance considerations: Noise sources in optical fiber communication, noise in p-n, p-i-n and APD receivers, Receiver structures.

Unit-V **10hrs**

Optical fiber communication systems: Principal components of an optical fiber communication system, source laminations, optical transmitter circuits, LED and laser drive circuits, optical receiver block diagram, simple circuits for pre-amplifier, automatic gain control and equalization, Regenerative repeater, BER of optical receiver, channel losses, ISI penalty and optical power budgeting for digital optical fiber system, line coding, analog systems, Direct intercity and sub carrier intensity modulation using AM, FM and PM. Block diagram and detection principle of coherent optical fiber system.

Suggested Readings:

1. Optical fiber Communication: John M.S Senior PHI, 2nd Ed.
2. Optical Communication: J. Gowar PHI, 2nd Ed.
3. Optical fiber Communication: G.E. Keiser McGraw-Hill, 3rd Ed.
4. Optoelectronics: Wilson & Hawkes PHI, 2nd Ed.

Course Code :TEC-703 **L T P C**

Course Name: Wireless Communication **3 0 0 3**

Unit-I **9 hrs**

Introduction.Cellular concept.System design fundamentals.Capacity improvement.Mobile radio wave propagation; reflection, diffraction, fading.Path loss prediction.

Unit-II **8 hrs**

Mobile radio propagation and fading in mobile propagation. Multipath propagation.Statistical characterization of multipath fading.Diversity.

Unit-III **9 hrs**

Link design. Design parameters for base station. Antenna location, spacing, heights and configurations.

Unit-IV **9 hrs**

Multiple access techniques; FDMA, TDMA and CDMA.OQPSK,Π/4- QPSK Spread spectrum. Power control.WCDMA.CDMA network design.

Unit-V **9 hrs**

GMSK, Gaussian Pulse Shaping,GSM. 3G systems.WLAN technology.WLL.HiperLAN. Introduction to Bluetooth.

Suggested Readings:

1. T.S.Rappaport, Wireless Communication Principles (2/e), Pearson.
2. W.C.Y.Lee, Mobile Communication Engineering. (2/e), McGraw- Hill,1998.
3. A.F.Molisch, Wireless Communications, Wiley, 2005.

Course Code :TMM-704 **L T P C**

Course Name: Principle of Management **3 0 0 3**

Unit-I **9 hrs**

Introduction to management, evolution of scientific management, modern management.Principles. Elements of management;. Planning, organizing, staffing, directing, coordinating, reporting, budgeting.

Unit-II **9 hrs**

Core concepts of marketing.need, want, demand, product, value, satisfaction, marketing mix- product, price, place, promotion.

Unit-III **9 hrs**

Financial management, objectives, scope, techniques of investment analysis, payback period, accounting rate of return, working capital, cost of capital.Sources of financing.

Unit-IV **9 hrs**

Technology management. Product design .Types of production system.Plant location-factors to be considered.Plant layout.Types of layout.Inventory management.

Unit-V **9 hrs**

Significance of HRM.HR planning job evaluation.Recruitment and selection.Placement and induction.Training.Performance appraisal.Compensation.Industrial relations.

Suggested Readings:

1. L.M.Prasad, Priciples and Practice of Management, S.Chand& Sons.
2. P.Kotler, Marketing Management (12/e), Pearson, 2005
3. P.Chandra, Financial Management Theory and Practice (3/e), TMH, 2004
4. K.Ashwathappa, Human Resources and Personnel Management (3/e),TMH, 2005
5. E.S.Buffa&R.K.Sarin, Modern Production/Operation Management (8/e), Wiley, 1994.

Course Code :TEC-711 **L T P C**

Course Name: Data Communication & Networks **3 0 0 3**

Unit-I **9 hrs**

Introduction to data communication

Goals and Applications of Networks, LAN, WAN, MAN, Wireless network, Protocol hierarchies, design issues of layers, Interfaces and services. Reference Model: The OSI reference model, TCP/IP reference model, The Internet.

Unit-II **6 hrs**

Physical Layer

Maximum data rate of a channel, Transmission media, Wireless transmission, Circuit switching, Packet switching, network topology.

Unit-III **8 hrs**

Data Link Layer

Data link layer design issues, services provided to network layers, Framing, Error control, Flow control, Error detection and correction, Elementary data link protocols, An unrestricted Simplex protocol, A Simplex Stop-and-Wait protocol, Simplex Protocol for a noisy channel, Sliding Window protocols, A protocol using go-back-N, A protocol using selective repeat, Example data link protocol-HDLC, PPP and SLIP.

Unit-IV **7 hrs**

Medium Access Sublayer

Channel Allocations, Static and dynamic allocation in LAN, Multiple Access protocols, ALOHA, Carrier Sense multiple access protocols, Wireless protocols, Collision free protocols, Limited contention protocols, IEEE standard 802.3 and Ethernet, IEEE standard 802.4, Token bus IEEE standard 802.5, Token Ring, Distributed Queue Dual bus, Logical link control, bridges, High speed LAN.

Unit-V **6 hrs**

Network Layer

Network Layer design issue, Routing algorithms, Congestion Control Algorithms, Internetworking.

Transport Layer

Transport services, Design issues, elements of transport protocols, simple transport protocols, Connection management, TCP, UDP.

Unit-VI **6 hrs**

Session, Presentation and Application Layer

Session Layer - Design issues, remote procedure call.
Presentation Layer - Design issues, Data compression techniques, cryptography.
Application Layer - File Transfer, Access and Management, Electronic mail, Virtual Terminals.**ISDN** Narrowband ISDN, Broadband ISDN and ATM, Virtual circuits

Suggested Readings:

1. A.S. TANENBAUM, Computer Networks, 3rd Edition, Prentice Hall India.
2. S. KESHAV, An Engineering Approach on Computer Networking, Addison Welsey.
3 .W .STALLINGS, Data and Computer Communication, Macmillan Press.

Course Code :TEC-712 **L T P C**

Course Name: Reliability Theory **3 0 0 3**

Unit-I **9 hrs**

Reliability and Data: Fundamentals of Reliability Theory, Elements of Reliability Components, Event Data Collection. Applications of Reliability theory in Engineering.

Unit-II **9 hrs**

Reliability Measure: Reliability function, Reliability and Hazard function for well known distributions e.g. Exponential Distribution, Normal Distribution, Log Normal Distribution, Weibull Distribution, Gamma Distribution. Hazard Models and Product life. Distribution Selection.

Unit-III **9 hrs**

Static Reliability Models: Series system, parallel system, series and parallel combinations, Complex System analysis. Reliability considerations in Design.

Unit-IV **9 hrs**

Reliability Estimation: Introduction, Reliability estimation for stress and strength with various distributions.Human factors in Reliability Risk Assessment. Reliability and Safety.

Unit-V **9 hrs**

Maintainability and Availability: Maintenance and Reliability. Optimal Maintenance and Replacement policies.Maintenance and ReliabilityInteraction.Reliability optimization.

Suggested Readings:

1. Reliability Engineering, Srinath LS, P East West Press.
2. Reliability Engineering, Balagurasamy ES, TMH Pub.
3. Practical Reliability Engineering, O`conner Patrick DT, Wily Pub.
4. Fault Tolerance and Reliability Techniques, Chakraborty K, Pearson Ed.

Course Code :TEC-713 **L T P C**

Course Name: Radar & Navigation Aids **3 0 0 3**

Unit-I **9 hrs**

Introduction to Radar Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies –Applications of Radar – The Origins of Radar ,The Radar Equation Introduction- Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets- Radar cross Section Fluctuations- Transmitter Power- Pulse Repetition Frequency- Antenna Parameters-System losses – Other Radar Equation Considerations

Unit-II **9 hrs**

MTI and Pulse Doppler Radar Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) - Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).

Unit-III **9 hrs**

Detection of Signals in Noise –Introduction – Matched –Filter Receiver –Detection Criteria – Detectors –-Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas - Phase Shifters - Frequency-Scan Arrays

Radar Transmitters- Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources - Other aspects of Radar Transmitter.

Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

Unit-IV **9 hrs**

Introduction-Four methods of Navigation Radio Direction Finding - The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders - The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders Radio Ranges - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR - Recent Developments.Hyperbolic Systems of Navigation

(Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System - Decca Receivers – RangeandAccuracy of Decca -The Omega System.

Unit-V **9 hrs**

DME and TACAN - Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment Aids to Approach and Landing - Instrument Landing System - Ground Controlled Approach System-Microwave Landing System(MLS) Doppler Navigation - The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems. Inertial Navigation - Principles of Operation - Navigation Over the Earth - Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems – Accuracy of Inertial NavigationSystems. Satellite Navigation System - The Transit System - Navstar Global Positioning System (GPS).

Suggested Readings:

1. Merrill I. Skolnik ," Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003
2. Peyton Z. Peebles:, "Radar Principles", Johnwiley, 2004
3. J.C Toomay, " Principles of Radar", 2nd Edition –PHI, 2004

Course Code :TEC-714 **L T P C**

Course Name:Biomedical Instrumentation **3 0 0 3**

Unit-I **9 hrs**

Electro-Physiology and Biopotential Recording

The origin of Biopotentials; biopotential electrodes; biological amplifiers; ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

Unit-II **9 hrs**

Bio-Chemical and Non Electrical Parameter Measurements

pH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

Unit-III **9 hrs**

Assist Devices

Cardiac pacemakers, DC Debrillators, Dialyser, Heart-Lung machine, Hearing aids.

Unit-IV **9 hrs**

Physical Medicine and Bio-Telemetry

Diathermies – Short-wave, ultrasonic and microwave type and their applications, Medical stimulator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

Unit-V **9 hrs**

Recent Trends in Medical Instrumentation

Thermograph, endoscopy unit, Laser in medicine, Surgical diathermy, cryogenic application, Electrical safety.

Suggested Readings:

1. John G.Webster, “Medical Instrumentation Application and Design”, John Wiley and Sons, New York, 1998.
2. Leslie Cromwell, “Biomedical instrumentation and measurement”, Prentice Hall of India New Delhi, 1997.
3. Khandpur, R.S, “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi, 1997.
4. Joseph J.Carr and John M.Brown, “Introduction to Biomedical equipment technology”, John Wiley and Sons, New York, 1997.

Course Code: XCS-700
Course Name: Career Skills **L T P C**
2 0 0 2

Unit I

Revision of Quantitative Aptitude

Unit II

Revision of verbal and non verbal reasoning

Unit III

Reading Comprehension, advanced Vocabulary

Unit IV

Revision of Para Jumbles, data interpretation part 2, critical reasoning

Unit V

Puzzles, GD, PI, Mock Tests, practice sessions

Suggested Readings

1. Arun Sharma &MeenakshiUpadhyay(Quantitative Aptitude,Logicalreasoning,Verbal Ability and Reading Comprehension)
2. Word Power Made Easy-Norman Lewis
3. Advanced English Grammar-Raymond Murphy(University of Cambridge Press)
4. Puzzles- George. J. Summers

Laboratory(All Experiments)

PEC-702CAD Of Electronics Lab

L	T	P	C
0	0	3	2

1. Design, simulation and analysis of two input NAND and NOR gate.
2. Design, simulation and analysis of Push Pull Amplifier.
3. Design, simulation and analysis of NMOS and CMOS inverter.
4. Design, simulation and analysis of Differential amplifier.
5. Design, simulation and analysis of Full Adder, Sub-tractors circuit.
6. Design, simulation and analysis of Up/ Down, Mod-m counter.
7. Design, simulation and analysis of 512X8 ROM.
8. Design, simulation and analysis of Static/ Dynamic hazards removal circuits.

SEMESTER VIII

Course Code :TEC-801 **L T P C**

Course Name: Satellite Communication **3 0 0 3**

Unit-I **8 hrs**

Elements of orbital mechanics.Equations of motion. Tracking and orbit determination. Orbital correction/control.Satellite launch systems. Multistage rocket launchers and their performance.

Unit-II **8 hrs**

Elements of communication satellite design. Spacecraft subsystems.Reliability considerations.Spacecraft integration.

Unit-III **8 hrs**

Multiple access techniques. FDMA,TDMA,CDMA. Random access techniques.Satellite onboard processing.

Unit-IV **10hrs**

Satellite link design: Performance requirements and standards. Design of satellite links – DOMSAT, INSAT, INTELSAT and INMARSAT. Satellite - based personal communication.

Unit-V **8 hrs**

Earth station design.Configiration.Antenna and tracking systems.Satellite broadcasting.

Suggested Readings:

1. D.Roddy, Satellite Communication (3/e), McGraw- Hill, 2001
2. T.Pratt&C.W.Bostain, Satellite Communication, Wiley 2000.
3. B.N.Agrawal, Design of Geosynchrons Spacecraft, Prentice- Hall,1986.

Elective-II

Course Code :TEC-821 **L T P C**

Course Name: Digital Image Processing **3 0 0 3**

Unit-I **8 hrs**

Linearity and space-invariance. PSF, Discrete images and image transforms, 2-D sampling and reconstruction, Image quantization, 2-D transforms and properties.

Unit-II **8 hrs**

Image enhancement- Histogram modelling, equalization and modification. Image smoothing , Image crispening. Spatial filtering, Replication and zooming, Generalized cepstrum and homomorphic filtering.

Unit-II **8 hrs**

Image restoration- image observation models.Inverse and Wiener filtering. Filtering using image transforms. Constrained least-squares restoration. Generalized inverse, SVD and interactive methods. Recursive filtering. Maximum entropy restoration. Bayesian methods.

Unit-IV **10hrs**

Image data compression- sub sampling, Coarse quantization and frame repetition. Pixel coding - PCM, entropy coding, runlength coding Bit-plane coding. Predictive coding. Transform coding of images. Hybrid coding and vector DPCM. Interframe hybrid coding.

Unit-V **10hrs**

Image analysis- applications, Spatial and transform features. Edge detection, boundary extraction, AR models and region representation. Moments asfeatures. Imagestructure.Morphological operations and transforms, Texture, Scene matching and detection. Segmentation and classification

Suggested Readings:

1. A.K. Jain, Fundamentals of Digital Image Processing, PHI, 1995.
2. R.C.Gonzalez& R.E. Woods; Digital Image Processing, (2/e), Pearson

Course Code :TEC-822 **L T P C**

Course Name:Spread Spectrum System **3 0 0 3**

Unit-I **5 hrs**

Introduction to spread spectrum, spread spectrum techniques, Direct sequence system, frequency hopping systems, pulse FM(chirp) system, hybrid systems.

Unit-II **10hrs**

Coding for communication and ranging- Property of codes for spread spectrum, Autocorrelation and cross correlation of codes, composite codes, code selection and signal spectra, error detection and correlation codes.

Unit-III **8 hrs**

Modulation and demodulation – Balance modulator, quadriphase modulator, frequency synthesis for spread spectrum modulation, in line and heterodyne correlation, base band recovery, phase lock loop, costas loop, FM feedback, PDM and FH demodulators.

Unit-IV **10hrs**

Need for synchronization, types of synchronizers, RF link- Noise figure, cochannel users, dynamic range and AGC, propagation medium, overall transmitter and receiver design.

Unit-V **8 hrs**

Test and evaluation of spread spectrum system selectivity, sensitivity, jamming margin, synch acquisition, processing gain.Transmitter measurements.

Suggested Readings:

1. R. C. Dixen, “Spread spectrum systems with commercial application”, Jhon Wiley, 3rd Ed.
2. H. Taube and D. L. Schilling, “Priciples of Communication systems”, Tata McGraw Hill, 2nd Ed. Reprint 2007.

Course Code :TEC-823 **L T P C**

Course Name: Filter Design **3 0 0 3**

Unit-I **6 hrs**

Review of op-amps circuits, Categorization of filters-Low-pass filter, High-pass filter, band-pass filter, band-reject filter, Gain equalizers, and Delay equalizers.

Unit-II **6 hrs**

Approximation Theory: Butterworth approximation, Chebyshev approximation, Inverse Chebyshev approximation, Basic of sensitivity, Frequency Transformations.

Unit-III **10hrs**

Three amplifier Biquad: Basic low pass and band pass circuit, realization of the general Biquadratic Functions, summing of four Amplifier biquad, feed forward three amplifier biquad, Passive Ladder structures, Inductor Substitution using Gyrator, Transformation of elements using the FDNR.

Unit-IV **6 hrs**

Elementary transconductor building blocks, resistors, integrators, amplifiers, summers, gyrator, First and second order filters, higher order filters.

Unit-V **8 hrs**

Switched capacitor filters: The MOS switch, The switched capacitor, first order building blocks, second order sections, sampled data operation, Switched capacitor first and second order filters, Bilinear transformation

Suggested Readings:

1. GobindDaryanani, “Principles of active network synthesis and design”,John Wiley and Sons.
2. R.Schaumann, M.E.VanValkenburg, “Design of analog filters”, Oxford University Press.

Course Code :TEC-824 **L T P C**

Course Name: Embedded System **3 0 0 3**

Unit-I **8 hrs**

Overview of various types of micro-controllers .Onchip data converters.watch dog timer.

Unit-II **8 hrs**

Intel family of microcontrollers 8051 /8031.architectures. Instruction set. Real time control of interrupts and timers.PIC series of microcontrollers.

Unit-III **8 hrs**

System design. Peripheral Interfacing .Digital and analog interfacing.Programming framework.Software development.

Unit-IV **8 hrs**

Real time operating systems.RTlinux. Development tools for micro-controller based system design.

Unit-V **8 hrs**

16 and 32 bit microcontrollers. 8096/80196 family.Motorola family MC68HC11/12. ARM 32 bit MCU.

Suggested Readings:

1. Raj kamal, Microcontrollers, Programming, Interfacing and System Design , Pearson, 2005
2. J.Morton, The PIC Microcontroller (3/e) , Elsevier, 2005

Elective-III

Course Code :TEC-831 **L T P C**

Course Name:Communication Electronics Circuits **3 0 0 3**

Unit-I **8 hrs**

Noise in Communication subsystems.Internal and external noise.Noise performance.LNA design.

Unit-II **8 hrs**

High frequency amplifier design. Shunt – series amplifier. Bandwidth enhancement.Neutralization and unilaterization.Cascaded amplifiers.

Unit-III **8 hrs**

RF power amplifiers. Design of class A, B, AB; C, D, E and F power amplifiers. Modulation of power amplifiers.

Unit-IV **10hrs**

Modulators and demodulators.Mixers.Circuits for generation and detection of AM, DSBSC, SSBSC, FM and FSK signal.PLL application.AGC circuits.

Unit-V **8 hrs**

Frequency synthesizers.Coherent synthesizers using PLL.Direct digital synthesis. Phase noise in oscillators.

Suggested Readings:

1. T.H.Lee, The Design of CMOS Radio – Frequency Integrated Circuits (2/e), Cambridge, 2004
2. J.S.Beasley&G.M.Miller, Modern Electronic Communication (8/e),Pearson.
3. J.Smith, Modern Communication Circuits (2/e), McGraw – Hill
4. T.L.Floyd, Electronic Devices (6/e), Pearson

Course Code :TEC-832 **L T P C**

Course Name:Advanced Microprocessors **3 0 0 3**

Unit-I **10hrs**

Advanced Microprocessor Architecture

Internal Microprocessor Architecture-Real mode memory addressing – Protected Mode Memory addressing –Memory paging - Data addressing modes – Program memory addressing modes – Stack memory addressing modes – Data movement instructions – Program control instructions- Arithmetic and Logic Instructions.

Unit-II **8 hrs**

Modular Programming And Its Concepts

Modular programming –Using keyboard and Video display –Data Conversions- Disk files- Interrupt hooks- using assembly languages with C/ C++

Unit-III **8 hrs**

Pentium Processors

Introduction to Pentium Microprocessor – Special Pentium registers- Pentium memory management – New Pentium Instructions –Pentium Processor –Special Pentium pro features – Pentium 4 processor

Unit-IV **8 hrs**

16-Bit Micro Controller

8096/8097 Architecture-CPU registers –RALU-Internal Program and Data memory Timers-High speed Input and Output –Serial Interface-I/O ports –Interrupts –A/D converter-Watch dog timer –Power down feature –Instruction set- External memory Interfacing –External I/O interfacing.

Unit-V **10hrs**

RISC Processors And ARM

The RISC revolution – Characteristics of RISC Architecture – The Berkeley RISC –

Register Windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction – The ARM processors – ARM registers – ARM instructions – The ARM built-in shift mechanism – ARM branch instructions – sequence control – Data movement and memory reference instructions.

Suggested Readings:

1. B.Brey, The Intel Microprocessors Etc, (4/e) PHI, 1998
2. D.Tabak, Advanced Microprocessors, McGraw- Hill, 1995
3. John Peatman, Design with Microcontroller McGraw Hill Publishing Co Ltd, New Delhi.
4. Alan Clements, "The principles of computer Hardware", Oxford University Press, 3rd Edition, 2003.
5. Rajkamal, The concepts and feature of micro controllers 68HC11, 8051 and 8096; S Chand Publishers, New Delhi.

Course Code :TEC-833 **L T P C**

Course Name:Digital Signal Processor & applications **3 0 0 3**

Unit-I **8 hrs**

Difference between DSP and other microprocessor architectures. Von neuman Architecture, Harvard architecture, Super Harvard architecture(SHARC),Multi Issue Architecture.An overview of Motorola and Analog Device DSPs.

Unit-II **8 hrs**

Fixed and Floating point DSP's,TMS320C54X fixed point and TMS320C3X floating point DSP architectures, CPU, memory, buses and peripherals. Addressing modes, instruction sets , control operations, interrupts.

Unit-III **8 hrs**

Repeat operations.Pipeline operation. Pipeline conflics and programming concepts.

Unit-IV **8 hrs**

Interfacing, serial interface, parallel interface, DMA operations, A/D and D/A converter interfaces.

Unit-V **8 hrs**

DSP tools.DSP applications.MAC, filter design, implementation of DFT, echo cancellation, spectrum analyzer.Speech and video processing.

Suggested Readings:

1. B.Venkataramani&M.Bhaskar, Digital Signal Processors, Architecture, Programming and Applications, TMH, 2003
2. S.Srinivasan& A. Singh, Digital Signal Processing, Thomson, 2004

Course Code :TEC-834 **L T P C**

Course Name:Artificial Neural Network & Fuzzy Logic **3 0 0 3**

Unit-I **8 hrs**

Introduction to Artificial Intelligence, Defining Artificial Intelligence, General Problem Solving Approaches in AI, The Disciplines of Artificial Intelligence, The Subject of Artificial Intelligence, Applications of Artificial Intelligence Techniques.

Unit-II **10hrs**

Neural Network Introduction and history, human brain, biological neuron, models of neuron, signal flow graph of neuron, feedback, network architecture, knowledge representation, Artificial intelligence and neural networks. Error correction learning, memory based learning, Hebbian learning, competitive learning, Boltzmann learning, learning with and without teacher, learning tasks, memory, adaptation. Artificial neurons, Neural networks and architectures, Introduction, neuron signal function, mathematical preliminaries, Feedforward& feedback archite.

Unit-III **10hrs**

Fundamentals of Fuzzy logic Systems, Fuzzy sets, Fuzzy Logic operations, Generalized Fuzzy operations, Implication, Fuzziness and fuzzy resolution, Fuzzy relations, Fuzzy decision making, Fuzzy Logic control, Defuzzification, Fuzzification, Fuzzy control architectures, properties of Fuzzy control.

Unit-IV **8hrs**

Genetic Algorithms introduction, genotype and fitness function, Genetic Algorithm operators, Integration of genetic algorithm with neural networks, Integration of genetic algorithm with Fuzzy logic.

Unit-V **8 hrs**

An overview of Digital Signal Processing (DSP), Intelligent Search, Logic Programming, Machine Learning.

Suggested Readings:

1. Fakhreddine O. Karray, Clarence De Silva, “Soft Computing and intelligent Systems Design”, Pearson Education
2. Jang J.S.R ,Sun C.T and Mizutami E - Neuro Fuzzy and Soft computing Prentice hall New Jersey,1998
3. Timothy J. Ross, “Fuzzy Logic with Engineering Applications,” McGraw-Hill Inc.