Department of Electronics
Shivaji University, Kolhapur

M.Sc. Electronics
Choice Based Credit system
With effect from June 2013

Rules and Regulations:

1. Core courses will be offered only to the students of M.Sc. Electronics.
2. The pre-requisites for electives and add-on courses will be decided by the departmental committee in consultation with the course co-ordinator.
3. Electives will be offered for minimum 10 and maximum 14 students in view of the infrastructure of the department. Electives to be offered or otherwise will be at the sole discretion of the departmental committee.
4. For add-on courses the minimum and the maximum limit of the students will be 10 and 20 respectively.
5. Minimum attendance required to appear for semester-end examination will be 75 % for each credit course.

6. The nature of semester-end examination question paper will be as follows :

Core / Elective course

Maximum marks 80
Time 3 Hrs

Q.1. Write short answers (Any four). (16)
a)
b)
c)
d)
e)
f)

Q.2. Based on Unit 1 (16)

OR

Q.2. Based on Unit 1 (16)

Q.3. Based on Unit 2 (16)

OR

Q.3. Based on Unit 2 (16)

Q.4. Based on Unit 3 (16)

OR

Q.4. Based on Unit 3 (16)

Q.5. Based on Unit 4 (16)

OR

Q.5. Based on Unit 4 (16)

7. The nature of Add-on course semester end examination will be as follows:

Add-on Course

Maximum marks 25
Time: 1 Hrs

Q.1. Write short answers (Any three). (12)
a)
b)
c)
d)
e)

Q.2. Based on Unit 1 (13)

OR

Q.2. Based on Unit 1 (13)

8. In addition to ascertain the successful assimilation of the prescribed credits the evaluation will be carried out as per the pattern defined in 6 and 7.
9. Minimum passing standard will be 40 %. There will be separate heads of passing for internal and semester-end examinations.
10. The practical examination and project evaluation of semester end examination will be adjudged by one internal and one external examiner.

M. Sc. Electronics (CBCS)
Course structure

Course Code	Title of the Course	Credits	Teaching Scheme (h/w)		Evaluation Scheme (marks)		
			L	P	CIE	SE	Total
	M.Sc. Part I - Semester I						
EC11	Audio and Video Engineering	4	4	-	20	80	100
EC12	Foundations of Microwave Technology	4	4	-	20	80	100
EC13	Computer Organization	4	4	-	20	80	100
EC14	Foundations of Power Electronics	4	4	-	20	80	100
EC15	Mathematical Techniques	2	2	-	10	40	50
EC16	Practicals – I	4	-	12	20	80	100
EC17	Practicals – II	4	-	12	20	80	100
	Total	26	18	24	130	520	650
	M.Sc. Part I - Semester II						
EC21	Digital Communication	4	4	-	20	80	100
EC22	Advanced Microwave Technology	4	4	-	20	80	100
EC23	Advanced Power Electronics	4	4	-	20	80	100
EC24	Optoelectronics	4	4	-	20	80	100
EC25	Technical Writing	2	2	-	10	40	50
EC26	Practicals – III	4	-	12	20	80	100
EC27	Practicals – IV	4	-	12	20	80	100
	Total	26	18	24	130	520	650
	M.Sc. Part II - Semester III						
EC31	Control Theory	4	4	-	20	80	100
EC32	Computer Networks	4	4	-	20	80	100
EE3*	Elective I	4	12	-	20	80	100
EE3*	Elective I	4	12	-	20	80	100
EC33	Practicals – V	4	-	12	20	80	100
EC34	Practicals – VI	4	-	12	20	80	100
	Total	24	32	24	120	480	600
	M.Sc. Part II - Semester IV						
EC41	Digital Signal Processing	4	4	-	20	80	100
EC42	Analog and Digital Circuit Design	4	4	-	20	80	100
EE4*	Elective – II	4	12	-	20	80	100
EE4*	Elective – II	4	12	-	20	80	100
EC43	Project	8	-	24	40	160	200
	Total	24	32	24	120	480	600

Department of Electronics
Shivaji University, Kolhapur

M. Sc. Electronics (CBCS)
Core, Elective and Add-on Courses

	Core Courses 4 credits		Elective Courses CBCS, 4 credits		Add on Courses CBCS, 2 Credits	
	Code	Course	Code	Course	Code	Course
Semester - I	EC11	Audio and Video Engineering			EA11	Microcontroller Programming in Embedded C
	EC12	Foundations of Microwave Technology			EA12	Principals of Digital Design*
	EC13	Computer Organization			EA13	Audio and Video Editing
	EC14	Foundations of Power Electronics				
	EC15	Mathematical Techniques				
	EC16	Practicals – I				
	EC17	Practicals – II				
Semester - II	EC21	Digital Communication			EA21	Introduction to LINUX*
	EC22	Advanced Microwave Technology			EA22	Project Design using MCS51 Family
	EC23	Advanced Power Electronics			EA23	Advanced Mobile Hardware and Software Aspects
	EC24	Optoelectronics				
	EC25	Technical Writing				
	EC26	Practicals – III				
	EC27	Practicals – IV				
Semester - III	EC31	Control Theory		Elective -I	EA31	Soft Computing Techniques
	EC32	Computer Networks	EE31	Microcontroller System Design and ARM Architecture		
	EC33	Practicals - V	EE32	Satellite Communications		
	EC34	Practicals - VI	EE33	Signals and Systems		
			EE34	Electronic Fuzzy Systems		
			EE35	Instrumentation		
			EE36	VHDL Programming		
			EE37	Mechatronics		
			EE38	Industrial Automation		
Semester - IV	EC41	Digital Signal Processing		Elective –II	EA41	Internet and Applications*
	EC42	Analog and Digital Circuit Design	EE41	ARM Programming and Embedded Communication Protocols	EA42	Android Application Development *
	EC43	Project	EE42	Advanced Microcontroller and RTOS		
			EE43	Cellular Mobile Communications		
			EE44	Electronic Neural Networks		
			EE45	Advanced Drives		
			EE46	Antennas		
			EE47	FPGA Based Systems		

* To be offered jointly by Department of Electronics and Computer Science.

Course Nomenclature

Exyz –

E	Electronics
x	C : core, E : elective, A : add-on
y	1 to 4 : Semester number
z	1 to 6 : course number

Add-on course – 2 Credit course

1 Credit for Theory – 15 contact hours

1 Credit for Practicals – 12 contact hours

M.Sc. Part I - Semester I
EC11 – Audio and Video Engineering

Unit I

Audio Systems:

Microphones, Loudspeakers, Speaker baffle and enclosure, Acoustics, Mono, Stereo, Quad, Amplifying systems, Equalizers and Mixers, Electronic music synthesizers, Commercial Sound, Theater sound system.

Unit II

Recording and Reproduction Systems:

Disc recording, Magnetic recording, Video tape recording, VCD and DVD recording, Dish antenna, Distortion and Noise reduction in Audio and Video System, Wireless reading device and Wi-Fi

Unit III

Television systems:

PAL, NTSC and SECAM.

Video Systems:

Monochrome TV, Colour TV standards, Luminance and chrominance signals, Video Telephone and Video Conferencing, Video text service, Digital TV, HDTV, Satellite TV, 3DTV.

Unit IV

Developments:

Image formatting, Data compression, UTRC test charts, and Remote controls.

Displays:

TFT-LCD, LED, OLED, QLED.

References:

1. Audio and Video System: R.G. Gupta, Tata McGraw-Hill Publishing.
2. Colour Television-Theory and Practice: S. P. Bali, Tata Mc Graw Hill.
3. Television engineering: A. M. Dhake, Tata Mc Graw Hill
4. Basic Television Engineering: Bernard Grob, Mc Graw Hill.
5. Television Electronics: Kiver, Kaufman, Golgotia Publication
6. Monochrome and Colour Television: R. R. Gulati, New age International Pub.-2003
7. Introduction to Data Compression: Guy E. Blelloch, blellochcs.cmu.edu, Sep. 2010
8. Digital Signal Processing (*Scientists and Engineers guide*): Steven W. Smith, California Technical Publishing. California, Second edition; 1999

EC12 - Foundations of Microwave Technology

Unit 1 :

Electrostatics, steady magnetic field and Maxwell's Equations

Vector analysis, physical interpretation of gradient, divergence and curl, Vector relations in other coordinate systems, Integral theorems, Fundamental relations of the electrostatic field, Gauss's law, Potential function, Field due to a continuous distribution of charge, Equipotential surfaces, Divergence theorem, Poisson's equation and Laplace's equation, electrostatic energy, magnetic induction and Faraday's law, Magnetic field strength and magnetomotive force, Ampere's work law in differential vector form, Energy stored in a magnetic field, Ampere's law for current element, Ampere's force law, Maxwell's equations, Conditions at a boundary surface

Unit 2 :

Electromagnetic Waves

Electromagnetic waves in a homogeneous medium- solution for free-space conditions, uniform plane-wave propagation, uniform plane waves, Wave equations for a conducting medium, Sinusoidal time variations, conductors and dielectrics, polarization, Direction cosines, Reflection and Refraction of plane waves - Reflection by perfect conductor-normal incidence, Reflection by a perfect conductor-oblique incidence, Reflection by perfect dielectric-normal incidence, Reflection by perfect insulator-oblique incidence, Reflection at the surface of a conductive medium, Surface impedance, Poynting' theorem, Interpretation of E x H, Instantaneous, average and complex Poynting vector

Unit 3 :

Transmission Lines

Distributed constants of a line, A-C steady state solution for Uniform line, Variation of Zo, α and β with frequency, Various exponential forms of A-C steady state solution, hyperbolic form of the solution, Interference and standing wave patterns, insertion ratio and insertion loss, Half-wavelength and Quarter wavelength lines, short sections as circuit elements, measurement of standing waves, Smith chart, impedance matching, Coaxial connectors,

Unit 4 :

Waveguides, cavity resonators and Passive Microwave Devices

Solution of wave equations in rectangular and circular waveguides, TE and TM modes, power loss and power transmission, excitation of modes, field components of rectangular cavity resonators, expression for Q.

Passive Microwave Devices

Terminations, Attenuators, Phase changers, directional couplers, Hybrid Circuits, Corners, Bends, Twists, Faraday rotation, Gyrator, Isolator, circulator, S parameters

Reference Books

1. Edward C. Jordan, Electromagnetic waves and Radiating Systems. New Delhi : Prentice-Hall of India Pvt. Ltd., 200
2. Walter C. Johnson, Transmission lines and Networks. New Delhi : McGraw- Hill Book Comp., 1988
3. John D. Ryder, Networks Lines and Fields. New Delhi : PHI, 1983

4. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi : PHI, 2001
5. H.R.L. Lamont, Waveguides. London : Methuen and Company Limited, 1963
6. Robert E. Collin, Foundations for Microwave Engineering. New Delhi : McGraw Hill Book Company,
7. Peter A. Rizzi, Microwave Engineering: Passive Circuits. New Delhi : PHI, 2001
8. F. E. Terman, Electronic and Radio Engineering. New York: McGraw Hill Book Comp. 1955.
9. D.M.Pazar, Microwave Engineering, Singapore : John Wiley and Sons (ASIA) Pte. Ltd., 2004

EC13 - Computer Organization

Unit 1:

Introduction : Computer system organization – hardware and software components, overview of Operating System, Computer booting process, Instruction set architectures, Chronology of Microprocessor Development w.r.t. CISC/RISC families, Timeline of POWER PC, Alpha SPARC families. Operating system case study: DOS, UNIX.

Unit 2:

Fundamental Architectures: Defining a Computer Architecture, Von Neumann and Harvard Architectures, bus topologies, pipelining, Superpipelining, Superscalar processors, Very Long Instruction Word (VLIW) architectures, multithreaded processors – superthreading, hyperthreading.

Unit 3:

Parallel Processors – Flynn's taxonomy. SIMD, MIMD and multi-computer approaches.

Implementation Considerations: memory technologies, Hierarchical Memory Systems, caches, prefetching techniques, virtual memory, pipelining, ternary logic, packaging considerations, wafer scale integration.

Unit 4:

Implementation of Functional Units: Memory Management, Arithmetic Logic Unit, Floating Point Unit, Branch Unit, Vector Unit, Load/Store Unit.

Development Tools: Microcomputer Development Systems (MDS), In Circuit Emulator (ICE), Assembler, Editors, Logic Analyser.

Reference Books:

1. The Essentials of Computer Organization and Architecture, by Linda Null and Julia Lobur ISBN:076370444x, Jones and Bartlett Publishers © 2003
2. Computer Organization and Design, The Hardware/Software Interface, Third Edition (The Morgan Kaufmann Series in Computer Architecture and Design), By David A. Patterson, John L. Hennessy, Publisher: Morgan Kaufman, ISBN- 10: 58606041.
3. Computer Organization and Embedded Systems, by Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian McGraw Hill Higher Education, Fifth Education
4. The Electronics Handbook Edited by Jerry C. Whitaker, Published by CRC Press and IEEE Press (1996), Section VII: Microelectronics and Section XIX: Computer Systems
5. Computer Organization by Stalling
6. Microprocessors and Interfacing, D.V. Hall, McGraw Hill (1986)
7. The Intel Microprocessors: Barry B. Brey, Prentice Hall Of India Ltd. (1997)

EC14 - Foundations of Power Electronics

Unit 1:

Fundamental of Power Electronics:-

Important rules for finding Fourier Series. Expression for Voltage, Current and Power factor. Laplace Transform, Inverse Laplace Transform. Performance parameter of Rectifiers. Introduction to Discrete Fourier transform.

Unit 2:

Basics of Electrical machines:-

D.C. motors, Types of D.C. motors, torque speed characteristics. Induction motors, Types of Induction motors. Synchronous machines and stepper motors.

Unit 3:

Converters:-

Single phase and three phase converters, Series converters, Dual converters. Effect of source and leakage inductance on the performance, Power factor improvement. Single phase dual converter, three phase dual converter, three phase AC voltage controllers

Unit 4:

PSPICE and power circuit simulation:
(a) introduction to PSPICE and its use in circuit simulation
(b) Basic power circuit simulation using PSPICE.

Reference Books.:-

1. Power Electronics P.C. Sen
2. Power Electronics R.M. Jalnekar & N.B. Pasalkar
3. Thyristor power Controllers. C.K Dubey, S. R. Doradla, A. Joshi & R.M. Sinha
4. Power Electronics – By M. Rashid
5. Power Semiconductor drives-S. B. Dewan, G.R. Sleman, A. Strauphan (WileyInt. Pub.-John Wiley Sons.)

EC15 - Mathematical Techniques

Unit 1:

Functions, Limits and Continuity:

Real functions and their graph, concept of limit of function, concept of continuous function.

Unit 2:

Differentiation:

Derivative at a point, interpretation of a Derivative at a point, derivative of a function. Differentiability, product rule, quotient rule, derivative of implicit and logarithmic function.

Unit 3:

Integration:

Infinite integrals, geometrical interpretation, properties of indefinite integrals. Integration by parts, Partial fraction, substitution.

Unit 4:

Fourier Series:

Definition of Fourier Series, calculation of coefficients in easy cases, elementary proportion, Fourier series exponential term, Fourier analysis of half, full wave rectifiers, sweep circuits.

Unit 5 :

Laplace Transform:

Laplace Transform and its existence, Laplace Transform of standard functions, properties of Laplace Transform, Laplace Transform of periodic functions, Laplace Transform of some special functions, inverse Laplace Transform, circuit analysis using Laplace Transform (R, RC, LC, RLC circuits).

References

1. Numerical Mathematical Analysis, J.B. Scarborough, Oxford and IBM Publishing Company (1979)

Semester I
Add-On Courses
EA11 - Microcontroller Programming in Embedded C

- Course code: EA11
- Title of the course : Embedded C for MCS51 Family
- Department at which course will be conducted : Electronics
- Duration: 4 weeks
- Contact Session: Theory- 15 Hours and Practical: 12 hours
- Credits: 2
  (1 credit for 15 Theory hrs. and 1 credit for 12 Practical hrs. per week)
- Course Coordinator/Instructor: Dr. P.A.Kadam
- Eligibility: Science graduate with Electronics at B.Sc II
- Prerequisites: Knowledge of microprocessors / microcontrollers, C programming language.
- Intake: 20 Min: (10) max.: (20)
- Course offered during : Odd semester (Sem I)
- Course Fee: Rs. 2,000/-
- Course Contents:

  Unit I:

  MCS51 Architecture, oscillator and clock, CPU registers – GPRs, SFRs, Flags, MCS51 memory organization, stack, I/O ports, Peripherals – Timer/counters, UART, Interrupts, Addressing modes, data transfer operations, logical operations, arithmetic operations, jump and call.

  Keil uVision IDE, Editing, compiling and simulating a project. C language extensions: Memory Areas, Memory Types, Memory Models, Data Types, Bit Variables and Bit-Addressable Data, Special Function Registers, Pointers, Function Attributes.

- Practical Assignments:
  1) Study of addressing modes (ALP)
  2) Study of logical instructions (ALP)
  3) Study of arithmetic instructions (ALP)
  4) Study of jump/call instructions (ALP)
  5) The 'Hello world' Program
  6) PORT I/O
  7) Timer/counter programming
  8) Serial communication using UART
  9) External interrupts
  10) Block processing/transfer using arrays

- Examination: : (25 Marks for theory , 25 Marks for practical)

- Books/References:

1) Kenneth J Ayala, The 8051 Microcontroller & Embedded Systems Using Assembly and C (With CD) 1st Edition, Delmar Cengage Learning (2010).
2) Subrata Ghoshal, 8051 Microcontroller: Internals, Instructions, Programming and Interfacing 1st Edition, Pearson Education (2010)
3) Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, The 8051 Microcontroller and Embedded Systems Using Assembly and C, Pearson (2007)

EA12 - Principals of Digital Design

- Course code: EA12
- Title of the course : Principals of Digital Design
- Department at which course will be conducted : Electronics
- Duration: 4 weeks
- Contact Session: Theory- 15 Hours and Practical: 12 hours
- Credits: 2
  (1 credit for 15 Theory hrs. and 1 credit for 12 Practical hrs. per week)
- Course Coordinator/Instructor: Dr. R.K.Kamat
- Eligibility: Science graduate with Electronics at B.Sc II
- Prerequisites: Knowledge of microprocessors / microcontrollers, C programming language.
- Intake: 20 Min: (10) max.: (20)
- Course offered during : Odd semester (Sem I)
- Course Fee: Rs. 2,000/-
- Course Contents:

Unit I:

Microelectronic devices, characteristics, mathematical modeling, performance parameters, design aspects, parasitics, integration issues, layout rules, optimization techniques.

Unit II:

System on Chip and MEMS: Chip architecture, Clock & power related issues, SRC, DRC, I/O architectures, Wire parasitic, Design validation, MEMS.

Reference Books:

1. Comer “Digital Logic and State Machine Design”, Sounders College Publications, New York.
2. Alley, Charles L, “Micro Electronics”, McGraw Hill Publications.

EA13 - Audio and Video Editing

- Course code: EA13
- Title of the course: AUDIO AND VIDEO EDITING
- Department at which course will be conducted: Department of Electronics, Shivaji University, Kolhapur.
- Duration: 07 weeks
- Contact Session: Theory 30 Hours
- Credits: 2
- Course Coordinator: Dr. M. K. Bhanarkar
- Eligibility: Any Science graduate
- Intake: 20 Min: (10) max.: (20)
- Course Fee: Rs. 2,000/-
- Course offered during: Odd semester (Sem I)
- Course Content –

UNIT – I

Introduction-Film and Television History & Film Appreciation, Types of Films, Television & Cinema, Camera & it's types, Taps-VHS, VCD, & DVD History & Meaning of Editing, Types of Editing, Principles of Editing, Concept of Linear & Non-Linear Editing, Computer as a tool for Editing, Equipments & Software's used in Non-Linear Editing Uses of Beta – Hi-Band, Low-Band, Understanding Clips, Media Files and Sequence, Basic Editing in the Timeline, Tools Palette, Audio Advanced Editing Subclips and Markers High Definition Transitions & Filters Rendering & Realtime Titles and Graphics Colour Correction.

UNIT – II

Concepts of On-line & Off-line Editing, Still, Video & Sound Editing Role/Duties/Functions of an Editor Understanding & identifying editing styles using documentaries, movies, ad films news telecast, etc. Working & training on graphic designing, editing, compositing, visual & sound effects software's, Premier Pro, Photoshop, Illustrator, Combustion, After Affects & Boris FX, Sound Forge, Avid Liquid, Final Cut Pro (FCP).

Reference books:

1. Final cut pro HD hands-on training by Larry Jordan.
2. Advanced color correction and effects in Final Cut Pro 5 by Alexis Van Hurkman.
3. Video Editing with Avid: Media Composer, Symphony, Xpress by Roger Shuffle bottom
4. Audio and Video systems-Principles, maintenance and troubleshooting by R. G. Gupta, IInd Edition, 2010.

M.Sc. Part I - Semester II

EC21 - Digital Communication

Unit 1 :

Signals Analysis :

Complex Fourier spectrum, Fourier transform, Properties of F.T, sampling theorem, random signals and noise, correlation and power spectrum.

Unit 2:

Digital Communication Systems:

A/D and D/A converter, Coded communication, AM, PWM, PPM, PCM, delta modulation, adaptive delta modulation, quantization and noise consideration.

Digital Transmission and Reception:

Timing, base band systems, ASK, FSK, PSK, QAM.

Unit 3 :

Error detection and coding:

Parity check, CRC, Hamming distance, Hamming codes, Cyclic codes, line synchronization codes, Manchester code, NRZ coding, Walsh codes.

Unit 4 :

Case studies:

Paging system, cellular telephone, global positioning satellite, Facsimile, Videotext.

Reference Books:

1. Analog and Digital Communication systems- M.S. Roden, 3rd Edition, Prentice Hall of India.
2. Modern Digital and Analog Communication Systems- B.P. Lathi.
3. Communication Techniques for digital and Analog signals – M. Kanefsky, John Wiley and Son.
4. Telecommunication – T.H. Brewster, McGraw Hill.
5. Principles of Digital communication, Das, Chatterjee and Mallick, Wiley Eastern Ltd.

EC22 - Advanced Microwave Technology

Unit 1 :

Microwave Tubes and Solid state Devices

Limitations of conventional tubes at microwave frequencies, Klystrons-Reentrant Cavities, velocity-modulation process, bunching process, output current and output power of two-cavity klystron, Reflex Klystrons-velocity modulation, power output and efficiency, electronic admittance, Helix Traveling-wave tubes (TWTs)-slow wave structures, amplification process, convection current, axial electric field, Magnetron Oscillators- cylindrical magnetron

Microwave solid state devices - Tunnel diode, GaAs diode, LSA diode, InP diode, CdTe diode, Read diode, IMPATT diode, TRAPATT diode a d BARITT diode.

Unit 2 :

Strip lines and MICs

Microstrip Lines-characteristic impedance, losses, Quality factor Q, Parallel Strip Lines-distributed parameters, characteristic impedance, attenuation losses, Coplanar Strip Lines, Shielded Strip Lines

Technology of Hybrid MICs - dielectric substrates, thick film technology and materials, thin film technology and materials, methods of testing, encapsulation, mounting of active devices, Lumped elements for MICs - design of lumped elements, fabrication of lumped elements, circuits using lumped elements, comparison with distributed circuits

Unit 3 :

Microwave Measurements

Detection of microwave power, Measurement of microwave power - bridge circuit, thermistor parameters, waveguide thermistor mounts, barretters, theory of operation of barretters, direct reading barretter bridges, Measurement of wavelength – single line cavity coupling system, transmission through two line cavity coupling system, Frequency pulling by reactive load, Typical wave meters, measurement of VSWR, measurement of attenuation – Definition of Attenuation, Methods of Measurement

Unit 4 :

Microwave Antennas, Radar and Radio Aids to Navigation

Classification of microwave antennas, General characteristics of microwave antennas, E plane and H plane sectoral horns, Pyramidal horn, design of paraboloid of revolution by aperture method, exciters for paraboloids of revolution, Cassegrain Reflectors

Radar equation, Pulse radar, Duplexer, Doppler Effect, CW radar, FMCW radar, MTI radar, conical-scan tracking radar, Loran, Radio Range, Aircraft landing systems, Radio Direction Finding,

Reference Books

1. Samuel Y. Liao, Microwave Devices and Circuits. New Delhi : Prentice-Hall of India, 2001
2. K.C. Gupta and Amarjit Singh, Ed., Microwave Integrated Circuits, Wiley Eastern Ltd. 1978
3. Carol G. Montgomery, Ed., Techniques of Microwave Measurement, Vol.1. New York : Dover Publications, Inc., 1966
4. Edward L. Ginzton, Microwave Measurements, New York : McGraw-Hill Book Company,
   1. Inc., 1957
5. A.Z. Fradin, Microwave Antennas. Oxford : Pergamon Press, 1961

6. F. E. Terman, Electronic and Radio Engineering, New York : McGraw Hill Book Company, 1955
7. Merill I Skolink, Introduction to Radar Systems, New Delhi : TMH Publishing Comp., 1997
8. Constantine A. Balanis, Antanna Theoty : Analysis and Design, Singapore : John Wiley and sons (ASIA) Pte. Ltd., 2002
9. Annapurna Das and Sisir K.Das, Microwave Engineering, New Delhi : Tata McGraw-Hill Publishing Company Ltd., 2000

EC23 - Advanced Power Electronics

Unit 1:

Choppers:-

Introduction, classification of choppers, control strategies.1) Pulse width modulation 2) Constant pulse width variable frequency. 3) Current limit control. 4) Variable pulse width & frequency. Chopper configurations, Single quadrant chopper, Four- quadrant chopper, Step down type & chopper with resistive load. Step up chopper impulse comm. Chopper impulse comm. Three thyrister choppers, resonant pulse chopper.

Unit 2:

Transistorized Inverter :-

a) Half Bridge Inverter: Square Wave half bridge inverter, Quasi-square wave inverter, PWM, inverter, thyristorised half bridge inverter, Device utilization factor, basic device isolation etc. Push pull inverter, Single-phase bridge inverter with resistive and inductive load, PWM bridge inverter, three phase inverters, CSI and variable dc link inverter.

b) Voltage control of single phase inverter. SPWM, MPWM, Sinusoidal PWM, Modified Sinusoidal pulse width modulation and Phase displacement control. Voltage control of three phase inverters

Unit 3:

Thyristorised Inverters.:

Forced commutated thyrister inverters. i.e. Auxillary commutated inverters, Mc Murray commutated inverter, Complementary commutated inverters/ Mc Murray Bedford inverter, Current source inverter, Series resonant inverter with unidirectional and bi-directional switches, Parallel resonant inverters, Resonant DC link inverter.

Cycloconverter: Single phase to single phase, Three phase to single, Three phase to three phase Cycloconverters.

Unit 4)

PWM Converters:

Introduction, topologies and applications, Linear regulator, buck regulator, boost regulator, Buck-Boost regulator and Link regulator, advantages & disadvantages ofthese topologies, Voltage regulators.

Applications of Power Electronics:

Electronic ballast, Power factor correction, Induction heating, Dielectric heating.

Reference books:

1. Power Electronics – By M. Rashid
2. Electronic drives- Concept & Applications –Vedam Subrahmanyam(THM)
3. Power Semiconductor drives-S.B.Dewan, G.R.Sleman, A.Strauphan(Wiley Int.Publ.-John Wiley Sons.)
4. Power Electronics – By P.C.Sen.

EC24 - Optoelectronics

Unit 1:

Introduction:

Historical developments, Optical fiber communication system, Principle of optical communication, Advantages of optical fiber communication, Total internal reflection, Acceptance angle, Numerical aperture, Skew rays, Cylindrical fiber.

Structure and types of optical cable:

Structure of optical fibers, Single and multimode fibers, Step index and graded index optical fiber.

Unit 2:

Transmission characteristics of optical fibers:

Mid-infrared and Far-infrared transmission, Inter-modal and Intra-modal dispersion, Overall fiber dispersion, Polarization.

Losses in optical fibers:

Attenuation, Material absorption losses, Linear scattering losses, Non-linear scattering losses and Fiber bends loss and Joint loss.

Preparation methods of optical fibers:

Liquid phase (melting) and Vapour phase deposition techniques.

Unit 3:

Optical fiber connection:

Joints, Fiber alignment, Splices, Connectors, Couplers.

Optical sources:

Absorption and emission of radiation, Einstein's relation, Population inversion, Optical emission from semiconductors, Semiconductor LASER, LED power and efficiency characteristics. Optical transmitter and receiver.

Unit 4:

Optical detectors:

Optical detection principles, Absorption and emission, Quantum efficiency, Responsivity, Long wavelength cutoff, p-n photodiode, p-i-n photo diode, photo transistors.

Optical fiber measurements:

Fiber attenuation measurements, Dispersion measurements, Refractive index profile measurements, Cut-off wavelength measurements, Numerical aperture measurements.

Reference books:

1. Optical fiber communications, Principles and Practice: John M. Senior, PHI.
2. Optical fiber communications: Gerd Keiser, Mc-Graw Hill International Edition.
3. Optical fiber communication: J. Gower, PHI.
4. Optical communications: components and systems: Franz and Jain, Narosa Publishing House.
5. Optical fiber systems, Technology design and applications: Charles K Kao, Mc- Graw Hill Int. Ed.

EC25 - Technical Writing

Unit 1:

Project Report Writing – selection of font, document formatting, citation styles, bibliography insertion, ethics in research documentation

Unit 2:

Journal/Conference Paper Writing – literature survey, visualization of data using graphs and tables, review of research articles

Patent Processing.

Semester II
Add-On Courses
EA21 - Introduction to LINUX

- Course code: EA21
- Title of the course : Introduction to LINUX
- Department at which course will be conducted : Jointly by Electronics and Computer Science
- Duration: 1 Months
- Contact Session: 30
- Credits: 2
  (1 credit for 15 Theory hrs. per week)
- Course Coordinator/Instructor: Dr. S.A.Shinde
- Eligibility: BCS, BCA or Science graduate with Electronics/Computer Science at B.Sc II
- Intake: Min: (10) Max.: (20)
- Course offered during : Even Semester (Semester II)
- Course Fee: Rs. 2000/-
- Course Contents:

UNIT I :

Introducing Linux

History, Distributions, Devices and Drives in Linux, File system Hierarchy, Components: Kernel, Distribution, XFree86, Sawfish, Gnome.

UNIT II:

User Software

GNOME Basics. Changing the desktop background, adding menu items, plugins. Changing the screen resolution, Evolution - the default e-mail client in Fedora., Mozilla - Web browser, Open Office - Productivity tools. Word processor, spreadsheet, presentation software. gaim - Chat application, XScreensaver.

The command-line: The command-line (shells, tab completion, cd, ls), file management: cd, df, find, locate

EA22 - Project Design using MCS51 Family

- Course code: EA22
- Title of the course : Project Design using MCS51 Family
- Department at which course will be conducted : Electronics
- Duration: 4 weeks
- Contact Session: Theory- 15 Hours and Practical: 12 hours
- Credits: 2
  (1 credit for 15 Theory hrs. and 1 credit for 12 Practical hrs. per week)
- Course Coordinator/Instructor – Dr. P.A.Kadam
- Eligibility: Science graduate with Electronics at B.Sc II
- Prerequisites: add-on course 'Embedded C for MCS51 Family'.
- Intake: 20 Min: (10) max.: (20)
- Course offered during : Even semester (Sem II)
- Course Fee: Rs. 2,000/-
- Course Contents:

Unit I:

Minimum system design using AT89S52, AT89C2051, AT89V51RD2 microcontrollers, PCB layout with Eagle software, clock, reset, external memory interface, interfacing peripherals – switch, LED, relay, optocoupler, 3x3 matrix keyboard, 7-segment display, ADC0809, DAC0804

Interfacing smart modules - 16x2 LCD module, PC Hyper-terminal serial link, Driving stepper motor, DC motor, SCR firing control, Voltage measurement, temperature measurement, speed measurement, multitasking.

- Practical Assignments:
  1) Eagle PCB Layout Editor
  2) Building single chip computer using AT89V51RD2 – PORT I/O Test
  3) Interfacing – 1 (LED, Switch, Relay, Optocoupler)
  4) Interfacing – 2 (Matrix Keypad, LED Bar)
  5) Interfacing – 3 (7-segment Display)
  6) Interfacing – 4 (16x2 LCD)
  7) Interfacing – 5 (ADC)
  8) Interfacing – 6 (DAC)
  9) Interfacing – 7 (PC – COM PORT)
  10) Interfacing – 8 (stepper motor)
  11) Voltage measurement using AT89V51RD2 board
  12) Temperature measurement using AT89V51RD2 board

- Examination: : (25 Marks for theory , 25 Marks for practical)

Books/References:

1. Kenneth J Ayala, The 8051 Microcontroller & Embedded Systems Using Assembly and C (With CD) 1st Edition, Delmar Cengage Learning (2010).
2. Subrata Ghoshal, 8051 Microcontroller: Internals, Instructions, Programming and Interfacing 1st Edition, Pearson Education (2010)
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, The 8051 Microcontroller and Embedded Systems Using Assembly and C, Pearson (2007)

EA23 - Advanced Mobile Hardware and Software Aspects

- Course code: EA23
- Title of the course: Advanced Mobile Hardware and Software Aspects
- Department at which course will be conducted: Department of Electronics, Shivaji University, Kolhapur.
- Duration: 07 weeks
- Contact Session: Theory 30 Hours
- Credits: 2
- Course Coordinator: Dr. M. K. Bhanarkar
- Eligibility: Any Science graduate
- Intake: 20 Min: (10) max.: (20)
- Course Fee: Rs. 2,000/-
- Course offered during: Even semester (Sem II)
- Course Content –

Unit I:

Basics and hardware

Basics:

Basics of mobile communication and electronics, Study of Digital Electronics, Assembling & disassembling of different types of mobile phones, Use of various tools & instruments used in mobile phone repairing, Details of various components used in mobile phones. Study of basic parts of mobile phones (mic, speaker, vibrator, LCD, antenna, etc), Testing of various parts with multimeter.

Hardware:

Basic Circuit Board / Motherboard Introduction, Names of different BGA ICs, Work of different BGA and Glass ICs, How to recognize different ICs, Soldering & de-soldering components using soldering iron, Soldering & de-soldering components using rework station, Working on SMD / BGA ICs and the PCB.

Unit II:

Software and troubleshooting

Software:

Introduction of various software faults, Introduction of different flasher boxes, Flashing of various brands of handsets, Formatting of virus affected handsets, Unlocking of handsets through codes and software, Downloading.

Troubleshooting

Fault finding & troubleshooting, Steps of repairing hardware and software problems, Circuit tracing, Troubleshooting through schematic diagrams, Repairing procedure for fixing other new hardware faults, Advanced troubleshooting techniques.

Reference books:

2. M Lotia, Modern (CDMA) Mobile Phone Practical Troubleshooting & repairing
2. Sanjib Pandit, Advance Mobile Repairing (Multicolour Circuits, service diagram and repairing).

M.Sc. Part II, Semester III
EC31 - Control Theory

Unit 1:

Introduction:

Basic Concepts of Control System, Open loop and Closed loop systems, Classifications, effect of feedbacks on Control System performance. Transfer function modeling and representation of Control system, pole & zero concept, Linear mathematical physical systems, Electrical analogy, Block reduction techniques, Signal flow graph, Mason's gain formula.

Unit 2:

Time Domain Analysis and stability

Type and Order of Control system, Typical tests signal, Time Response of first and second order systems to unit step input, Steady state errors, Time Domain Specifications of Second Order System, Dominant Closed loop Poles of Higher Order Systems. Concept of Stability: absolute, relative and marginal, nature of system response, stability analysis using Hurwitz's criterion, Routh's criterion, Basic properties of Root Loci, construction of Root loci, Angle and magnitude condition for stable systems, concept of inverse root locus and root contour.

Unit 3:

Frequency Domain and State Variable Analysis

Steady state response of a system to sinusoidal input, Relation between time and frequency response for second order systems, Frequency response specifications, Stability Analysis with Bode Plots, Polar Plots, conformal mapping, Nyquist stability criterion. Introduction to state space analysis, State space representation for i) Electrical Network ii) nth order differential equation iii) Transfer function. State model from transfer function using: Direct, parallel, cascade, decomposition method.

Unit 4:

Control system components and controllers

Modeling and transfer function of control system components- Potentiometer, DC and AC Servomotors, gear trains, tacho-generators. Design concepts of P, PI, PD, PID controllers, Compensator Networks-lag and lead.

Reference Books:

1. I.J. Nagrath, M.Gopal "Control Systems Engineering", 5th Edition, New Age International Publication
3. Ogata Katsuhiko, "Modern Control Engineering", 4th Edition, PHI.
4. Kuo B.C. Automatic Control System, PHI, New Delhi
5. Schaum's Series book "Feed back Control Systems".
6. Les Fenical "Control Systems", 1st Edition, Cengage Learning India.
7. Samarjeet Ghosh, "Control Systems Theory & Applications", 1st edition, Pearson education.
8. S.K. Bhattacharya, "Control Systems Engineering", 1st edition, Pearson education.
9. Norman S. Nise, "Control System Engineering", 5th Edition, Wiley.

EC32 - Computer Networks

Unit 1:

Unix Operating System:

Introduction, applications Unix Shell, Kernel and Application layer, file system features and benefits, File Management in utilities: pwd, cd, ls, cat, mv, ln, rm, rmdir, find, cut and paste etc., Internal file structure, Directory and directories used by Unix system, The Shell: Shell commands, I/O redirection, pipes and filters, pipe fitting, wildcard, matching background processing, shell script shell variables, shell as programming language, Unix vi editor.

Unit 2:

Computer Networking:

LAN, Cabling and Topologies: Various transmission media, Twisted and untwisted pairs, coaxial cables, fiber-optic cables and characteristics, wireless LAN, Cabling Topologies: hierarchical, bus, ring, star, collapsed star, mesh. Origin and definition of LAN, types and uses of LAN, LAN components: NIC N/W cables, hubs, and OS, LAN types: MAP, ARCnet, Apple Talk etc., MAN and WAN, repeaters, Bridges, Routers, Gateways, Backbones etc.

Unit 3:

The O.S.I. reference model:

N/W architecture, OSI reference model, data transmission, FDM, TDM, circuit switching, message switching, packet switching, hybrid switching, LAN static and dynamic channel allocation, LAN protocols, IEEE standard 802 for LAN, comprises of LAN's, The Internet: Introduction, Architecture,

Unit 4:

Internet addresses:

Three primary classes of IP addresses, Dotted decimal notation, network, broadcast and loopback address. Internet Protocol (IP) – Connectionless Datagram Delivery, Routing, Error and Control Messages. User Datagram Protocol (UDP): Introduction, Format of UDP Messages, UDP encapsulation, UDP port numbers. Transmission Control Protocol (TCP): Reliability of transmission, ports, connections and endpoints, Concept of sliding windows, TCP segment format, Establishing, closing and resetting a TCP connection, TCP port numbers, ATM Network.

Applications: Remote Login (TELNET), File transfer (FTP), Electronic Mail, (SMTP), Future of TCP/IP – Ipv6 (introduction)

Reference Books:

1. Unix for you – Pramod Koparkar, Tata McGraw Hill
10. Unix utilities – R. S. Tare, McGraw Hill.
11. Understanding Unix – J.R. Groff and P.N. Weiberg, Que Tech. Publication, Singapore.
12. Internetworking with TCP/IP – Volume I, II, III, Author – Douglas E. Comer, Prentice Hall of India.
13. TCP/IP Protocol Suite, Behrouz A Forouzan, McGraw Hill.
14. Computer Networks, Andrew S. Tanenbaum, PHI.

Semester III
Elective –I
EE31 - Microcontroller System Design and ARM Architecture

Unit 1:

Review of microcontroller solutions for control/measurement systems, their analog and digital features (8051, PIC, AVR, MSP430): architectural benefits, Key characteristics, Digital I/O, interrupts, timer/counters, RTC, analog comparator, ADC, PWM, UART, I2C, clock oscillators, low power operating modes, watchdog timer, ISP/IAP techniques.

Unit 2:

System Design:

Minimum system with 89C51/PIC microcontrollers to monitor frequency, voltage, displacement, liquid level, weight, speed, traffic light control system with software development for above.

Isolation Techniques:

Realys, opto-couplers and their specifications, Interfacing of Relays and opto-couplers with microcontrollers, isolation methods for heavy and a.c. loads.

Signal Transmission:

V to I and I to V Conversion, V to F and F to V Conversion, Electrostatic Shielding and Grounding.

Unit 3:

Transducers and digital sensors for temperature, pressure and speed, signal conditioning, Instrumentation Amplifiers for RTD, thermocouple, bridge and LVDT, System design with 89C51 for measurement and control of temperature, pressure, speed using ON/OFF, Proportional and PID modes, stability aspects of the system, s/w development.

Unit 4:

ARM Architecture:

Introduction to ARM microprocessor and its features, Architecture, Programming model, Processor Operating States, registers, Exceptions, ARM organization – 3-stage/5-stage pipelined ARM organization.

Reference Books:

1. Datasheets and application notes of 8051 (P89C51RD2), AVR (ATMEGA32), PIC (16F877) and TI MSP430 microcontrollers.
2. K.J. Ayala, The 8051 Microcontroller, Thomson Press (India) Ltd.
3. Microcontrollers: theory and applications By Ajay V Deshmukh, TMH.
4. Microprocessors application in Process control – S.I. Ahson, TMH.
5. Transducer Interfacing Handbook, D.H. Sheingold, Analog Devices Technical Handbook Norwood, USA.
6. ARM System-on-chip Architecture, Steve Furber, Addison Wesley.

EE32 - Satellite Communications

Unit 1 :

Satellite Systems

History of satellite communications, Orbital mechanics, Look angle determination, Orbital perturbations, Satellite subsystems – AOCS, TTC and M, power systems, communications subsystems, satellite antennas, Satellite frequency bands, satellite Multiple access formats

Unit 2 :

Modulation, Encoding and Decoding

Analog modulation, Digital Encoding, Spectral shaping, Digital decoding, Error correction Encoding, Block Waveform Encoding, Digital Throughput.

The Satellite Channel

Electromagnetic field propagation, Antennas, Atmospheric losses, receiver Noise, Carrier to Noise ratios, satellite link analysis, Frequency Reuse by dual polarization, Spot beams in satellite downlinks.

Unit 3 :

The Satellite Transponder

The transponder model, the satellite front end, RF filtering of digital carriers, Satellite signal processing, Transponder Limiting, Non linear satellite amplifiers, Effect of non linear amplification on digital carriers.

Satellite Ranging System

Ranging system, Component Range Codes, Tone Ranging Systems

Unit 4 :

Multiple access formats

FDMA - FDMA system, Nonlinear amplification with multiple FDMA Carriers, FDMA, FDMA Nonlinear analysis, FDMA characterization, AM/PM conversion with FDMA, Satellite switched FDMA.

TDMA -The TDMA system, preamble design, Satellite Effects on TDMA performance, Network synchronization, SS TDMA.

CDMA - Direct Sequence CDMA system, Performance of DS CDMA, satellite systems, Frequency Hopped CDMA, Antijam advantages of spectral spreading, Code Acquisition and Tracking

Reference Books

1. Robert M. Gagliardi, Satellite Communications, New Delhi : CBS Publishers and Distributors, 2000
2. Timothy Pratt, Charles W. Bostian, Jeremy E. Allnutt, Satellite Communications, Singapore : John Wiley and Sons Inc. 2003
3. Dennis Roddy, Satellite Communications. New York : McGraw-Hill, 2001

EE33 - Signals and Systems

Unit 1:

Introduction

Introduction to signals, Classification of signals, Elementary signals, Signal operations, Signal implementation with MATLAB, Introduction to systems, Examples of systems, Classification of systems.

Unit 2:

Continuous-time systems

Continuous-time signals and systems, Time-domain analysis of LTIC system, Representation of LTIC systems, Impulse response of a system, Convolution integral, Graphical method for evaluating the convolution integral, Properties of the convolution integral, Impulse response of LTIC system.

Unit 3:

Fourier & Laplace Transforms and CT System

Signal representation using Fourier series, Orthogonal, Properties of exponential CTFS, Application of Fourier series, Continuous-time Fourier transform, CTFT for aperiodic signals, Inverse Fourier transform, Properties of the CTFT, CTFT of periodic functions, LTIC systems analysis using CTFT, MATLAB exercises, Laplace transform, Inverse Laplace transform, Properties of the Laplace transform, Solution of differential equations, Characteristic equation, zeros, and poles, Stable and causal LTIC systems, LTIC systems analysis using Laplace transform, Block diagram representations.

Unit 4:

Case Studies

Continuous-time filters, Filter classification, Non-ideal filter characteristics, Design of CT low pass filters, Frequency transformations, Case studies for CT systems: Amplitude modulation of baseband signals, Mechanical spring damper system, Armature-controlled dc motor.

Reference Books:

1. Simon Haykin, Barry Van Veen- ‘Signals & system’ - IInd Edition Wiley publication
2. Michael J. Roberts.-‘Fundamentals of signals & systems’- Tata McGraw Hill, 2007.
3. Alan V. Oppenheim, Alan S. Wilsky, S. Hamid Nawab -‘Signals & system’ -IInd Edition - Pearson Education.
4. Charles L. Philips, John M. Parr, Eve A. Rislein ‘Signals, system & transform’ , IIIrd Edition, Pearson Education.
5. B.P. Lathi, “Linear Systems and Signals”, 2nd Edition, Oxford University Press, 2004.
6. Charles Phillips, “Signals , Systems and Transforms” , 3rd Edition, Pearson Education.
7. Nagoor Kani, Signal and Systems, Tata McGraw Hill Education Private Ltd, New Delhi, 3rd reprint, 2011

EE34 - Electronic Fuzzy Systems

Unit 1:

Fuzzy Sets and Membership Function

Crisp set versus Fuzzy Set, Notion and representation of Fuzzy Set, Fuzzification, Types of membership functions, Properties of Fuzzy Set, Operations and Implications with Fuzzy Set, Fuzzy Number and Fuzzy Interval Arithmetic, Fuzzy Extension Principle, Alpha-Cut Fuzzy Set and Decomposition Principle, Software/Hardware implementation of Fuzzy Set, Problem Solving with Fuzzy Set.

Unit 2:

Fuzzy Relation

Concept of Fuzzy Relation, Crisp Relation versus Fuzzy Relation, Binary and n-ary Fuzzy Relations, properties of Fuzzy Relation, Operation with Fuzzy Relation, Fuzzy Equivalence and Tolerance Fuzzy Relations, Projection of Fuzzy Relation and Cylindrical Extension, Composition of Fuzzy Relation, Problem Solving with Fuzzy Relation.

Unit 3:

Fuzzy Inference

Exact and Approximate Reasoning, Fuzzy Rules, Types of Fuzzy Reasoning, Mamdani and TSK-Methods of Fuzzy Reasoning, Process, Defuzzification, Defuzzification Methods, Fuzzy Inference Process, Compositional Rule of Inference, Fuzzy Inference System, Fuzzy Logic Control, Application Examples.

Unit 4:

Electronic Fuzzy Circuits

Fuzzy Logic Gates in Voltage and current modes, Fuzzy Flip-flops, Fuzzy Logic Circuits, Design considerations of Digital Fuzzy Logic Controllers, Software-Hardware Implementation: Computer/Microcontroller based Fuzzy Systems.

Reference Books

1. K. Tanaka, An introduction to Fuzzy Logic for Practical Application, Springier, New York.
2. A.M. Ibrahim, Introduction to Applied Fuzzy Electronics, Prentice Hall of India, New Delhi
3. G.J. Klir and B. Yuan, Fuzzy sets and Fuzzy Logic, Prentice Hall of India.
4. J. Yen and R. Langari, Fuzzy Logic Intelligence, Control and Information, Pearson Education Pvt. Ltd. India
5. M J Patyra and D M Mlynek, Fuzzy Logic, Wiley Teubner, New York
6. Cox E., The Fuzzy Systems Handbook-A Practitioners Guide to building, using and maintaining Fuzzy Systemsm AP-Professional, Boston
7. Driankov D., Hellendoom H and Reinfrank M., An Introduction to Fuzzy Control, Narosa Publishing House, New Delhi
8. S. N. Sivanandam, S. N. Deepa,, Wiley, India (P) Ltd., Principles of Soft Computing, Ist Indian Edition,
9. S. Rajsekaran, G. A. VijayalaxmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and applications, PHI, New Delhi

EE35 - Instrumentation

Objectives:

- To understand the configurations and functional descriptions of measuring instruments
- To understand the basic performance characteristics of instruments
- To understand the working principles of various types of sensors and transducers and their use in measuring systems
- To understand the techniques involved in various types of instruments
- To understand the relevance of electronics with other disciplines

Unit-1:

Introduction to Measurement and Measurement Systems

Definition and significance of measurement, Classification of Instruments and types of measurement applications, Elements of an instrument/ measurement system, Active and passive transducers, Analog and digital modes of operation, Null and deflection methods, Input-output configuration of instruments and measurement systems, Methods of correction of instruments and measurement systems

Generalized performance characteristics of instruments: Static characteristics and static calibration, Meaning of static calibration, True value, basic statistics, Least–squares calibration curves, Calibration accuracy versus installed accuracy, Combination of components errors in overall system accuracy calculations, Theory validation by experimental testing

Unit-2:

Motion Measurement

Methods of transduction, Primary sensing elements and transducers, Electrical transducers, Classification of transducers

Motion and dimensional measurement: Fundamental standards, Relative displacement- translational and rotational, Calibration, Resistive potentiometers, Resistance strain gauge, Differential transformers, Variable –inductance and variable – reluctance pickups, Eddy current non contacting transducers, Capacitance pickups, Piezoelectric transducers, Digital displacement transducers (translational and rotary encoders), Ultrasonic transducers. Detailed discussion of Strain Gauges, LVDT and Synchros

Relative velocity: translational and rotational, Calibration, Average velocity from measured Δx and Δt, Tachometer encoder methods, Laser based methods, Stroboscopic methods, Translational–velocity transducers (moving coil and moving magnet pickups)

Relative acceleration measurements: Seismic-(absolute-) displacement pickups, Seismic-absolute-) velocity pickups, Seismic-(absolute-) acceleration pickups (accelerometers)

Unit-3:

Process Parameter Measurements

Force, Torque and Shaft power: Standards and Calibration, Basic methods of, bonded strain gauge, differential transformer, Piezoelectric, variable reluctance/ FM oscillator Digital system, Torque measurement on rotating shafts

Pressure and Sound Measurement: Standards and calibration, Dead weight gauges and manometers, Low pressure measurement: McLeod gauge, Knudsen gauge, Viscosity, Thermal conductivity, Ionization, Sound level meter, microphone, capacitor microphone

Flow measurement: Pitot-static tube, Yaw tube, hot wire and hot film Anemometers, Laser Doppler anemometer. Gross Volume Flow Rate: Rotameters, turbine, Ultrasonic flow meter, Electromagnetic flow meters

Temperature and Heat measurement transducers: Standards and Calibration, bimetallic thermometers, Liquid in glass thermometers, pressure thermometers, RTD, Thermocouples, Thermistors, Semiconductor based temperature sensors. Detailed discussion on basics of thermocouples, Laws of thermocouples, cold junction compensation; thermistor types, materials used, application circuits, LM35

Radiation fundamentals: detectors, optical pyrometers, IR imaging systems, Heat flux sensing: Slug type sensors, Gorden gauge

Unit-4:

Special Amplifiers, Signal Analyzers and telemetry

Instrumentation Amplifiers, Need for choppers, chopper stabilized and carrier amplifiers.

Signals and signal analysis: Basic wave analyzer, harmonic distortion analyzer, Spectrum analyzer, Digital Fourier analyzer

Wheatstone bridge, Q meter, LCR bridges, RF Output power meters, Field strength meter, Phase meter, Vector impedance meter (direct reading)

Telemetry: Methods of data transmission, General Telemetry system, Types of Telemetry system: Voltage telemetry, current telemetry system

Introduction to recorders

Text/ Reference Books:

1. Measurement Systems, Applications and Design by Ernest O. Doeblin and Dhanesh N. Manik, 5th Edition, Tata McGraw Hill
2. A Course in Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney, Dhanpat Rai & Co.
4. Electronic Instrumentation, Kalsi, TMH
5. Measurements and instrumentation, U. A Bakshi and A.V Bakshi, 3rd Edition
6. Modern Electronic Instrumentation and measurements technique, Cooper and Helfrick, PHI

EE36 - VHDL Programming

Unit-1 :

Introduction: Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, logical operators. Types of delays Entity and Architecture declaration. Introduction to behavioral, dataflow and structural models.

Unit-2 :

VHDL Statements : Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.

Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

Unit-3 :

Sequential and Combinational Circuit Design: VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc. Sequential Circuits Design : VHDL Models and Simulation of Sequential Circuits Shift Registers, Counters etc.

Unit -4 :

Prototyping and case studies: Design with CPLDs and FPGAs,

Programmable logic devices : ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGA,

Design of Microcomputer: Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL

Reference Books:

1. Digital System Design using VHDL: Charles. H.Roth ; PWS (1998).
15. VHDL-Analysis & Modelling of Digital Systems: Navabi Z; McGraw Hill.
16. VHDL by Douglas L. Perry, Mc Graw Hill Publications
17. VHDL: Analysis and Modeling of Digital Systems by Zainalabedin Navabi, McGraw-Hill
18. Logic and Computer Design Fundamentals, 2/E, M. Morris Mano
19. Digital Electronics Laboratory Experiments Using the Xilinx XC95108 CPLD with Xilinx Foundation: Design

EE37 - Mechatronics

Unit 1 :

Introducing Mechatronics, Sensors and Transducers, Signal Conditioning, Digital Signals, Digital Logic

Unit 2 :

Pneumatic and Hydraulic Actuation Systems, Mechanical Actuation Systems, Electrical Actuation Systems

Unit 3 :

Basic System Model, System Models, Dynamic Responses of System, System Transfer Functions, Frequency Response

Unit 4 :

Closed-loop Controllers, Input/Output Systems, Communication Systems, Fault Finding, Mechatronic Systems

Reference Books

1. William. Bolton, Mechatronics, fourth Edition, New Delhi : Pearson Education in South Asia, 2011

EE38 - Industrial Automation

Unit 1:

Process Models:-

Static model dynamic models, Step response methods- two parameter model, three parameter model & four parameter model. Models for oscillatory system, method of moments. Disturbance models- measuring noise characteristics.

Controller Principles :-

Process Characteristics - process equation, process load, process lag, self regulation Control system parameters- Error, variable range, control parameter range, control lag, dead time, cycling.

Unit 2:

Tuning of Controllers :-

Control modes: - Discontinuous- two position, multi position, floating control Continuos – proportional, integral, derivative & composite modes Control paradigms- Cascade control., Criteria for controller tuning-specified decay ratio, minimum integral of absolute error (IAE), minimum integral of time & absolute error. (ITAE) closed loop response methods: ultimate method damped oscillation method Process reaction curve & open loop tuning.

Unit 3:

Programmable Controllers and SCADA

PLC Basics: Programmable Controllers – functional diagram, operation, programming. PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

PLC Programming. Ladder diagrams for process control: Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

PLC Registers

Introduction to SCADA

Unit 4.

Digital Controller design:

Controller Design techniques, Bode diagram method, PID controller, Root Locus Method – Root locus Plot, Controller design, State Space Method – Controllability Observability , Full-state feedback Regulators Tracker, Regulator design by pole placement, Controlling Voltage, Controlling Current, Control of Induction Motor

Reference book :

1. John W. Webb and Ronald A. Reiss, Programmable Logic Controllers – Principle and Applications, Fifth Edition, PHI
2. JR. Hackworth and F.D Hackworth Jr ., Programmable Logic Controllers – Programming Method and Applications. – Pearson, 2004.
3. L. Umanand, Power Electronics Essentials and Applications, Wiley.

Semester III
Add-On Course
EA31 - Soft Computing Techniques

- Course code: EA31
- Title of the course : Soft Computing Techniques
- Department at which course will be conducted : Electronics
- Duration: 4 weeks
- Contact Session: Theory- 15 Hours and Practical: 12 hours
- Credits: 2
  (1 credit for 15 Theory hrs. and 1 credit for 12 Practical hrs. per week)
- Course Coordinator/Instructor – Dr. R.R.Mudholkar
- Eligibility: Science graduate with Electronics at B.Sc II
- Intake: 20 Min: (10) max.: (20)
- Course offered during : Odd semester (Sem III)
- Course Fee: Rs. 2,000/-
- Course Contents:

Unit 1:

Fuzzy Set: Crisp and non-crisp set, Capturing uncertainty, Definition of Fuzzy Set, Graphical Interpretations, Fuzzy Operations, Fuzzy Reasoning, Fuzzy Inference, Application Examples.

Biological Model, Information flow in neural cell, Artificial Neuron, Functions, Equations, Elements, Single and Multilayer Perceptrons, Training and Learning Methods, What is GA? Mechanics of Biological evolutions, Artificial Evolutions and Search Optimization, Typical case studies of Soft Computing.

Reference Books

1. S. N. Sivanandam, S. N. Deepa, Principles of Soft Computing, Wiley, India (P) Ltd., Ist Indian Edition, 2008
2. S. Rajsekaran, G. A. VijayalaxmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and applications, PHI, New Delhi
3. Rajkumar Roy, Mario Koppen, Soft Computing and Industry: Recent Applications, Springer.
4. F.O. Karray, C.D. Silva, Soft Computing and Intelligent Systems Design-theory, tools and applications, Pearson Education
5. J.S.R. Jang, C.T. Sun & E. Mizutani, Neuro-Fuzzy and Soft Computing-A computational approach to learning and machine intelligence, Pearson Education

Practicals:

1. Fundamental operations on Fuzzy Sets and Fuzzy Numbers
2. Mamdani Method of Fuzzy Reasoning
3. Fuzzy Relation and Compositional Rule of Inference
4. Binary Classification by Perceptron
5. Learning Methods of Artificial Neural Network
6. Case studies of Soft Computing

M.Sc. Part II, Semester IV
EC41 - Digital Signal Processing

Unit 1:

Discrete Time Signals and Systems

Discrete Time Signals: Representation, Standard Discrete Time Signals, Classification of Discrete Time Signals and systems, Simple Manipulations of Discrete Time Signals, Sampling of Analog signals, Aliasing, Sampling Theorem. Discrete Time System: Block diagram representation of Discrete Time Systems, Convolution Sum, Causality and Stability condition in terms of the Impulse Responses.

Unit 2:

Z Transform and Analysis of Discrete Time System

Z transform and ROC, Inverse Z transform, Analysis of LTI Systems in Z domain: System Function of LTI system, Transient and Steady state responses, Causality and Stability of System. Solution of difference Equations, Frequency Domain Sampling: Discrete Fourier Transform, IDFT, The DFT as Linear Transformation, Properties of the DFT, Use of DFT in linear filtering, FFT Algorithms: Radix2 DIT and DIF algorithms to compute DFT and IDFT.

Unit 3:

Design and Realization of Digital Filters

FIR Filter Structure and Design: Direct and cascade forms, frequency sampling and linear phase structure. Windowing method, Frequency sampling method of design,IIR Filter structure and Design: Direct form, Cascade form, Parallel form. Impulse invariance, Bilinear Transformation method of design,

Unit 4:

DSP Architecture

Architectural features of DSP processors: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSP, Multiple access memory, Multiport Memory, Pipelining, Special addressing modes, On-chip Peripherals, Different generation of DSP Processors, Fixed point and floating point numeric representation and Arithmetic, Introducing the TI 6000 platform, Features of TMS320C62X Processors, EDMA, Port Interface, External Memory Interface (EMIF), Interrupts, Timers, Basic Interfacing Techniques.

Reference Books:

1. John G Prokis, Manolakis, Digital Signal Processing-Principles, Algorithms and Application, 4th Edition, Pearson Education Publication
2. Salivahanam, A Vallavaraj, C. Guanapriya, Digital Signal Processing, 1st Edition, Tata McGrawHill, New Dehli
3. P. Ramesh Babu, Digital Signal Processing, 4th Edition, Scitech Publication.
4. A. Ambardar, Digital Signal Processing: A Modern Introduction, Cengate Learning India Pvt Ltd, New Dehli
5. P. Pirsch, Architectures for Digital Signal Processing, John Wiley publication, New Delhi
6. Phil Lapsley, DSP Processor Fundamentals: architectures and Features, Wiley publication
7. S.K. Mitra,Digital Signal Processing Computer Based Approach, TMH. New Dehli. 2009
8. M. Bhaskar, Digital Signal Processorsby B.Venkataramani, Architecture, programming and applications, TMH, New Dehli

EC42 - Analog and Digital Circuit Design

Unit I:

Zener series and shunt regulators, transistors as series and shunt regulators, regulator design with discrete components and IC 741/78xx, current sources and their design with discrete components and ICs, SMPS design.

Unit II:

Design of multivibrators, (AMV, MMV, BMV) using ICs (555, 741), schimitt trigger, triangular waveform generator, design of oscillators (wein bridge, phase shift colpitt, harltey) using 741, PLL IC LM565, VCO LM566, analog multiplexer IC4051/52, design of RF tuned amplifier,

Unit III:

CMOS-TTL and TTL-CMOS interfaces, design of counter using FF and counter ICs, Oscillator design using Schmitt trigger (7414), inverter and NAND gate, MMV using gates and ICs (74/54121, 74221), design of binary to gray code converter, design of BCD to excess-3, excess-3 to BCD converter, design of full adder using MUX, design of 16-1 using 4 4-1 MUXs, design of parity checker, memory interfacing, RAM ROM and EEPORM

Unit IV:

Design of ON OFF, proportional and PID controller, design of capacitance and inductance meter, design of DVM using 7107, design of frequency synthesizer, design of digital multimeter.

Reference Books:

1. Introduction to system design using ICs- B.S. Sonde, Wiley Western Ltd.
2. Circuit Consultants Handbook , Hemmnigway
3. Microprocessor and Microcontroller – BPB handbook
4. Digital Fundamentals, Floyd, USB, New Delhi
5. Designing with OP-AMP analog and digital ICs, S.Francio, McGraw Hill.
6. Application and Design with analog ICs, J.Michel Jacob, Printice Hall of India

Semester IV
Elective – II
EE41 - ARM Programming and Embedded Communication Protocols

Unit 1:

The ARM instruction set:

Introduction, exceptions, conditional execution, Branch and branch with link, software interrupt, data processing instructions, multiply instructions, data transfer instructions.

Architectural support for HLLs: Data types, Expressions, Conditional statements, loops.

Unit 2:

Inter-Integrated Circuit (I2C) BUS:

I2C bus specification, general characteristics, bus signals, Address mechanism, Applications – microcontroller interfacing examples for I2C EEPROM, RTC, ADC, and digital temperature sensors.

Unit 3:

Serial peripheral interface (SPI):

Introduction, Specifications, master slave configuration, applications - microcontroller interfacing examples for SPI EEPROM, RTC, ADC and digital temperature sensors.

Unit 4:

Recent embedded protocols:

Controller Area Network (CAN): Specifications, basic concepts, Frame types, bus signals, Error handling, Addressing.

Introduction to IButton devices, 1-wire protocol.

Reference books:

1. David Seal, ARM Architecture reference manual, Addison-Wesley Professional; 2nd Edition, 2001. SBN-10: 0201737191
2. Steve Furber, ARM System-on-chip Architecture, Addison Wesley. (2nd Edition) 2000 ISBN-10: 0201675196
3. The I2C-bus specification, http://www.semiconductors.philips.com/i2c, Philips semiconductor, 2000.
4. PIC/AVR datasheets for I2C, SPI functions.
5. Overview and use of the SPI PICmicro Serial Peripheral Interface, Microchip Inc. http://www.microchip.com.
6. Robert Bosch GmbH, CAN Specification, 1997.

EE42 - Advanced Microcontroller and RTOS

Unit 1:

Introduction to microchip PIC microcontroller: PIC microcontroller features, scaling of PIC MCU families, overview of baseline, midrange, enhanced midrange, and high-end core devices.

Core architecture: PIC Architecture, Program memory, Addressing Modes, Instruction set.

MPLAB IDE overview: Using MPLAB, Toolbars, Select Development Mode And Device Type, Project, Text Editor, Assembler, MPLAB Operations.

Unit 2:

PIC MCU Hardware: reset, clock, control registers, register banks, program memory paging, Ports, interrupts, Timer and Counter, watchdog timer, power up timer, sleep mode, state machine programming.

Overviews of PIC tools – Development softwares, compilers, debug tools.

Unit 3:

Introduction to RTOS, Scheduler, objects, services. Tasks, task states and scheduling, synchronization, communication and concurrency.

Kernel objects: Semaphores, queues, pipes, event registers, signals, and condition variables.

Exceptions and interrupts: Introduction, Exception v/s Interrupt, Applications of exceptions and interrupts.

Unit 4:

Timer and timer services: Introduction, Real-time clock and system clock, Programmable interval timers, Timer ISRs, Timing wheels, soft timers.

I/O subsystem: Basic I/O concepts, The I/O subsystem.

Memory Management: Introduction, Dynamic memory allocation in Embedded systems, Fixed-size memory allocation, blocking v/s non-blocking memory functions, H/W memory management units

Reference Books:

1. Ajay V Deshmukh, Microcontrollers: theory and applications, TMH.
2. Myke Predko, Programming & Customizing PICmicro Microcontrollers, TMH.
3. Tim Wilmshurst, Designing Embedded Systems with PIC Microcontrollers, Newnes.
4. David W Smith,PIC in Practice, Newnes.
5. John Morton, PIC: Your Personal Introductory Course, Newnes.
6. Qing Li, Caroline Yao, Real-Time Concepts for Embedded Systems, CMP Books.
7. David E. Simon, An Embedded Software Primer, Addison-Wesley.
8. Raj Kamal , Embedded Systems: Architecture, Programming and Design, 2nd Edition, McGraw-Hill Education, ISBN-10: 00701253
9. Jean J. Labrosse, MicroC OS II: The Real Time Kernel, Publisher: CMP Books, ISBN-10: 9787820103

EE43 - Cellular Mobile Communications

Unit 1 :

Introduction to Cellular mobile systems, Elements of Cellular radio system Design, specifications of analog systems, Cell coverage for signal and traffic

Unit 2 :

Cell-site antennas and mobile antennas, Co-channel interference reduction, Types of non co-channel interference, Frequency management and channel assignment

Unit 3 :

Handoffs and dropped calls, operational techniques and Technologies, switching and traffic

Unit 4 :

Introduction to digital systems, Digital cellular systems, Intelligent cell construction and Applications, Features of handset, SMS, Security

Reference Books

1. William C.Y. Lee, Mobile Cellular Telecommunications : Analog and Digital Systems, Singapore : McGraw-Hill, 1995
2. William C.Y. Lee, Mobile Communication Engineering, McGraw-Hill

EE44 - Electronic Neural Networks

Unit 1:

Fundamental of Neural Network

Canonical form of biological Neuron, Notion of Artificial Neuron, Electronic Comparison between Biological and Artificial Neural Networks, Advantages and Application domains of Artificial Neural Network Neuron, Concept of Artificial Neural Network, Models of Artificial Neuron: McCulloch-Pitts Model, Basic Elements, Activation Functions, Artificial Neural Network Architectures: Single and Multi Layer, Feed Forward, Recurrent, Learning Process, Types of Learning

Unit 2:

Supervised Learning

Perceptron Networks, Learning Rule, Perceptron, Adaptive Linear Neuron, Delta Rule, Back Propagation Network, Training and Testing Algorithms, Radial Basis Function Network, Time Delay, Functional Link, Tree, Wavelet Neural Networks.

Unit 3:

Unsupervised Learning

Fixed Weight Competitive Network, Theory, Architecture, Training Algorithm: Kohonen Self-Organizing Feature Maps, Learning Vector, Quantization, Adaptive Resonance Theory Network, ART-1 and ART-2.

Unit 4:

Electronic Neural Circuit and Applications

Realization of Logic Gates, Parity Checker, Half and Full Adder, Neural Fault Detector, Design considerations of Digital Neural Controller, Application Examples, Software-Hardware Implementation: Computer/Microcontroller based Neural Systems.

Reference Books

1. S. N. Sivanandam, S. N. Deepa,"Principles of Soft Computing", Wiley, India (P) Ltd., Ist Indian Edition,
2. S. Rajsekaran, G. A. VijayalaxmiPai," Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and applications", PHI, New Delhi
3. Rajkumar Roy, Mario Koppen "Soft Computing and Industry: Recent Applications", Springer.
4. A.M. Ibrahim, Introduction to Applied Fuzzy Electronics, Prentice Hall of India,New Delhi.
5. V.B. Rao and H.V. Rao, C++ Neural Networks and Fuzzy Logic, B.P.B. Publications, New Delhi.
6. B. Yegnanarayana, Aritifical Neural Network, PHI, New Delhi
7. Alision carling, Introduction to Neural Network, Galgotia Publications, New Delhi.
8. B. Kosko,Neural Network and Fuzzy System, PHI, New Delhi
9. J. M. Zurada, Introduction to Artificial Neural systems, 6th Edition, Jaico Publishing House, Delhi
10. B. Yegnanarayana, Artificial Neural Networks, 6th Edition, PHI, New Delhi
11. Satish Kumar, Neural Networks: A class room Approach, Tata Microcontroller ,McGraw Hill, New Delhi

EE45 - Advanced Drives

Unit 1:

Basic of Electrical machines:-

D.C. motors, Types of D.C. motors, torque speed characteristics. Induction motors, Types of Induction motors. Synchronous machines.

Unit 2:

D.C. Motor Control:-

Separately excited DC motors with rectified single phase supply- single phase semi converter and single phase full converter for continuous and discontinuous modes of operation. Three phase semi converter and three phase full converter for continuous and discontinuous modes of operation. Closed loop control of phase controlled DC motor Drives: - Open loop Transfer function of DC Motor drive- Closed loop Transfer function of DC Motor drive –Phase-Locked loop control.

Chopper controlled DC motor drives, Closed loop control of chopper fed DC motor Drives

Unit 3:

AC motor Control:

Voltage Source Inverter Fed Induction motor drives : - Scalar control- Voltage fed Inverter control-Open loop volts/Hz control-Speed control with slip regulation-Speed control with torque and Flux control-Current controlled voltage fed Inverter Drive. Current Source Inverter Fed Induction motor drives : -

Current-Fed Inverter control-Independent current and frequency control-Speed and flux control in Current-Fed Inverter drive-Volts/Hz control of Current-Fed Inverter drive-Efficiency optimization control by flux program.

Slip power recovery schemes: -

Slip-power recovery Drives-Static Kramer drive, Static scherbius drive. Vector control of Induction Motor.

Unit 4:

Stepper motors:-

Classification, types, modes of excitations, Drive requirements, Unipolar voltage drive for various reluctance, motor bipolar voltage drive for permanent magnet and hybrid step motors. Drives for specific applications: - Drive considerations for textile mills, steel rolling mills, cranes and hoist drives, cement mills, sugar mills, paper mills, coal mills, centrifugal pumps.

Reference Books:

1. Electronic drives- Concept & Applications –Vedam Subrahmanyam(THM)
2. Power Semiconductor drives-S.B.Dewan, G.R.Sleman, A.Strauphan (Wiley Int.Publ.-John Wiley Sons.)
3. Power Electronics – By P.C.Sen.
4. Power Electronics –C.W.Lander(MHI Publication
5. Power Electronics and Motor Control – Shepherd, Hulley, Liang – II Edition, Cambridge University Press
6. Modern Power Electronics and AC Drives –B. K. Bose-Pearson Publications

EE46 - Antennas

Unit 1 :

Basic Antenna Concepts

Radiation pattern, Beam area, Radiation power density, Radiation intensity, Directivity, Gain, Aperture concept, Antenna efficiency, Half power beamwidth, Beam efficiency, Bandwidth, Polarization, Input impedance, Antenna radiation efficiency, Antenna vector effective length and effective areas, Maximum directivity and maximum effective area, Effective height, Friss transmission formula, Duality of antennas, Antenna temperature

Unit 2 :

Radiation Integrals and Auxiliary potential functions, Linear wire antennas

Vector potential for an electric current source, Vector potential for magnetic current source, Electric and magnetic fields for electric and magnetic current sources, Solution of the inhomogeneous vector potential wave equation, Far field radiation, Infinitesimal dipole, Small dipole, Region Separation, Finite length dipole, Half-wavelength dipole, Linear elements near or on infinite perfect conductors, Ground effects

Unit 3 :

Point Sources and arrays of point sources

Power theorem and its application to an isotropic source, Radiation Intensity, Source with Hemispheric, unidirectional cosine, bidirectional cosine, sine(doughnut), sine- squared (doughnut), unidirectional cosine-squared power patterns, Directivity, Source with arbitrary shape Gain, Field patterns, Arrays of two isotropic point sources, Nonisotropic but similar point sources and the principle of pattern multiplication, pattern synthesis by pattern multiplication, Nonisotropic and dissimilar point sources, Linear arrays of n isotropic point sources of equal amplitude and spacing, Null directions

Unit 4 :

Loop, Traveling wave, broadband and other types of antennas

Small circular loop, Circular loop of constant current, Circular loop with nonuniform current, Ground and Earth curvature effects, Polygonal loop antennas, V antenna, Rhombic antenna, Helical antenna, electric-magnetic dipole, Yagi-Uda array of linear elements, Yagi-Uda array of loops, basics of microstrip antennas, Plane reflector, Corner reflector

Reference Books

1. John D.Kraus, Antennas, New Delhi: Tata McGraw-Hill Publishing Company Ltd, 1999
2. Constantine A.Balanis,Antenna Theroy Analysis and Design, Wiley India P. Ltd, 2010

EE47 - FPGA Based Systems

UNIT 1:

Introduction, Basic Concepts, Digital Design and FPGAs, FPGA-Based System Design, Summary, Problems.

Introduction, Manufacturing Processes, Transistor Characteristics, CMOS Logic Gates, wires, Registers and RAM, Packages and Pads, Summary

UNIT 2:

FPGA Fabrics:

Introduction, FPGA Architectures, SRAM-Based FPGAs, Permanently Programmed FPGAs, Chip I/O, Circuit Design of FPGA Fabrics, Architecture of FPGA Fabrics, Summary.

UNIT 3:

Combinational Logic.

Introduction, The Logic Design Process, Hardware Description Language, Combinational Network Delay, Power and Energy Optimization, Arithmetic Logic, Logic Implementation for FPGAs, Physical Design for FPGAs. The Logic Design Process Revisited. Summary.

UNIT 4:

Sequential Machines.

Introduction, The Sequential Machine Design Process, Sequential Design Styles, Rules for Clocking, Performance Analysis, Power Optimization, Summary.

Reference Books:

1. Wayne Wolf, FPGA based System design
2. Ian Grout, Digital Systems Design With FPGAs And CPLDs, Elsevier(2008)
3. Rajanish K. Kamat, Santosh A. Shinde, Vinod G Shelake, Unleash the System On Chip Using FPGAs and Handel C, Springer (2010)

Semester IV, Add-On Courses
EA41 - Internet and Applications

- Course code: EA41
- Title of the course : Internet and Applications
- Department at which course will be conducted : Electronics
- Duration: 4 weeks
- Contact Session: Theory- 15 Hours and Practical: 12 hours
- Credits: 2
  (1 credit for 15 Theory hrs. and 1 credit for 12 Practical hrs. per week)
- Course Coordinator/Instructor: Dr. R.K.Kamat
- Eligibility: Science graduate with Electronics at B.Sc II
- Prerequisites: Knowledge of microprocessors / microcontrollers, C programming language.
- Intake: 20 Min: (10) max.: (20)
- Course offered during : Even semester (Sem IV)
- Course Fee: Rs. 2,000/-
- Course Contents:

UNIT I:

Motivation for internetworking, the TCP/IP internet, internet service, internet protocol and standardization, Ethernet, FDDI, LAN, WAN, ATM, application and network level interconnection, properties of internet, internet architecture, inter connection through IP routers, Internet addresses.

UNIT II:

Good web design, the process of web publishing, document overview, header elements, heading, image, forms, tables, website hosting, HTTP & URL, search engines, Social Networking and other applications of Internet in Education and research

BOOKS

1. Douglas E. Comer "Internetworking with TCP/IP", Volume-I, PHI.
2. Thomas A. Powell "The Complete reference HTML", TMH.
3. Douglas Comer "The Internet Book - Pearson Education", Asia
4. K.Kalata "Internet Programming Thomson learning".
5. E.Stephen Mack & Janan Platt "HTML 4.0", BPB Pub
6. Joel sklar "Principles of Web Design", Vikas Pub. House.

EA42 - Android Application Development

Syllabus to be offered by Computers Science Department