SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY COIMBATORE-8

(AN AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY CHENNAI)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.E (ELECTRONICS AND COMMUNICATION ENGINEERING)

AUTONOMOUS CURRICULUM AND SYLLABUS

REGULATIONS 2011(REVISED)

(FOR STUDENTS ADMITTED DURING 2012-2013 AND ONWARDS)

FROM THE ACADEMIC YEAR 2016 - 2017

SRI KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY COIMBATORE-8

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VISION

To be a center of excellence for technological education, training & Research and to produce world class Engineers who can be placed in top core companies to serve the nation and the society.

MISSION

- **To provide intensive training in the fundamentals as well as the current trends in the field of Electronics and Communication Engineering.**
- **To continuously update the various facilities in the department and facilitate R&D and Consulting activities.**
- **To provide placement assistance to the students.**
- **To disseminate the knowledge by organizing seminars, Faculty Development Programs and Workshops.**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- **PEO I. Excel in professional career to provide engineering solution by demonstrating technical competence in electronics and communication engineering.**
- **PEO II. Identify, analyze and formulate problems to offer appropriate design solutions that are technically superior, economically feasible, environmentally compatible andsocially acceptable.**
- **PEO III. Achieve progress in professional and research career through communication skills, team work and knowledge up-gradation through continuous education.**

PROGRAMME OBJECTIVES(POs)

- **PO a: Apply the knowledge of the physical sciences, mathematics, computing, Electronics and Communication Engineering fundamentals for modeling and solving complex engineering problems.**
- **PO b: Design and Conduct scientific and engineering experiments, as well as to analyze, evaluate and Interpret generated data pertaining to engineering activities.**
- **PO c: Design and evaluate complex systems for specific purpose in Electronics and Communication Engineering, with due considerations for economic, environmental, social, political, ethical, health and safety considerations**
- **PO d: Identify complex Electronics and Communication Engineering problems, formulate, analyze, design and provide solution for them.**
- **PO e: Apply appropriate techniques, skills, and modern tools for the design and analysis of engineering systems.**
- **PO f: Attain broad education to provide engineering solution by taking environment and sustainability into consideration**
- **PO g: Understand the contemporary technical, Professional issues and provide engineering solution for societal problems**
- **PO h: Develop consciousness of professional, ethical, legal, security, social issues and responsibilities**
- **PO i: Function effectively as individuals and in teams which may involve people from diverse background to accomplish a common goal**
- **PO j: Communicate effectively both in written and oral form to address activities with engineering community and society**
- **PO k:Engage in lifelong learning through higher studies/additional qualifications to adapt technical changes**
- **PO l:Apply engineering and management fundamentals to manage the projects in time with due consideration for finance**

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B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

(For students admitted during the academic year 2012-13 onwards)

Sl. No	Code	Course	Hours /week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: I		**THEORY**							
1	11USL101	Communication Skills –I	3	0	1	3	40	60	100
2	11USM101	Engineering Mathematics-I	3	1	0	4	40	60	100
3	11USC103	Chemistry for Electrical Sciences	3	0	0	3	40	60	100
4	11USP103	Physics for Electrical Sciences	3	0	0	3	40	60	100
5	11UCK102	Fundamentals of Computing & C programming	3	0	0	3	40	60	100
6	11UBK101	History of Electronics & Communication Engineering	1	0	0	1	100	-	100
7	11UBK102(R)	Electron Devices	3	0	0	3	40	60	100
PRACTICAL									
1	11USH111	Physical Sciences Lab-I	0	0	3	1	40	60	100
2	11UCK105	Computing& C programming Lab	0	0	3	2	40	60	100
3	11UAK105	Engineering Practices Lab	0	0	3	2	40	60	100
		Total	19	1	10	25			1000
					30				

Sl. No	Code	Course	Hours /week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: II		**THEORY**							
1	11USL201	Communication Skills –II	3	0	1	3	40	60	100
2	11USM201	Engineering Mathematics-II	3	1	0	4	40	60	100
3	11USC201	Environmental Science and Engineering	3	0	0	3	40	60	100
4	11USP203	Science of Engineering Materials	3	0	0	3	40	60	100
5	11UFK221(R)	Basics of Electrical Engineering	3	0	0	3	40	60	100
6	11UBK202	Circuit Theory	3	1	0	4	40	60	100
PRACTICAL									
1	11USH211	Physical Sciences Lab- II	0	0	3	1	40	60	100
2	11UBK203	Devices and circuits Lab	0	0	3	2	40	60	100
3	11UAK203	Engineering Graphics Lab	1	0	3	3	40	60	100
		Total	19	2	10	26			900
					31				

L-LECTURE T-TUTORIALS P- PRACTICALS

CA-CONTINUOUSASSESSMENT FE-FINAL EXAM

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

(For students admitted during the academic year 2012-13 onwards)

Sl. No	Code	Course	Hours/week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: III		**THEORY**							
1	11USM301	Engineering Mathematics-III	3	1	0	4	40	60	100
2	11UBK301	Solid state circuits-I	3	1	0	4	40	60	100
3	11UBK302	Digital Electronics	3	1	0	4	40	60	100
4	11UBK303(R)	Network Analysis and Synthesis	3	0	0	3	40	60	100
5	11UDK351	Data Structures & Object Oriented Programming	3	0	0	3	40	60	100
6	11UBK304(R)	Electromagnetic Fields	3	1	0	4	40	60	100
PRACTICAL									
1	11UBK305	Digital Electronics Lab	0	0	3	2	40	60	100
2	11UBK306	Solid State Circuits Lab-I	0	0	3	2	40	60	100
3	11UDK353	Data Structures& Object Oriented Programming Lab	0	0	3	2	40	60	100
		Total	18	4	9	28			900
					31				

Sl. No	Code	Course	Hours /week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: IV		**THEORY**							
1	11USM405	Probability and Random Process	3	1	0	4	40	60	100
2	11UBK401	Solid State Circuits-II	3	1	0	4	40	60	100
3	11UBK402	Analog Communication	3	0	0	3	40	60	100
4	11UBK403 (R)	Measurements and Instrumentation	3	0	0	3	40	60	100
5	11UBK404 (R)	Signals and Systems	3	1	0	4	40	60	100
6	11UBK405	Linear Integrated Circuits	3	0	0	3	40	60	100
PRACTICAL									
1	11UBK406	Communication Lab-I	0	0	3	2	40	60	100
2	11UBK407	Solid state Circuits Lab-II	0	0	3	2	40	60	100
3	11UBK408	Linear Integrated Circuits Lab	0	0	3	2	40	60	100
		Total	18	3	9	27			900
					30				

L-LECTURE T-TUTORIALS P-PRACTICALS CA- CONTINUOUS ASSESSMENT
FE-FINAL EXAM

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

(For students admitted during the academic year 2012-13 onwards)

Sl. No	Code	Course	Hours /week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: V			**THEORY**						
1	11UBK501	Digital Signal Processing	3	1	0	4	40	60	100
2	11UBK502	Computer Networks	3	0	0	3	40	60	100
3	11UBK503	Microprocessor & Microcontrollers	3	0	0	3	40	60	100
4	11UBK504	Digital Communication	3	1	0	4	40	60	100
5	11UBK505 (R)	Transmission Lines and Waveguides	3	1	0	4	40	60	100
6	11UBE5XX	Elective -I	3	0	0	3	40	60	100
PRACTICAL									
1	11UBK506	Microprocessor & Micro controllers Lab	0	0	3	2	60	40	100
2	11UBK507	Digital Signal Processing Lab	0	0	3	2	60	40	100
3	11UBK508	Communication Lab-II	0	0	3	2	60	40	100
		Total	18	3	9	27			900
					30				

Sl. No	Code	Course	Hours /week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: VI			**THEORY**						
1	11UBK601	Wireless Communication	3	0	0	3	40	60	100
2	11UBK602	VLSI Design	3	1	0	4	40	60	100
3	11UBK603	Antenna and Wave Propagation	3	1	0	4	40	60	100
4	11UBK604	Embedded systems	3	0	0	3	40	60	100
5	11UBE6XX	Elective –II	3	0	0	3	40	60	100
6	11UFK621	Control systems	3	0	0	3	40	60	100
PRACTICAL									
1	11UBK605	Networking Lab	0	0	3	2	60	40	100
2	11UBK606	VLSI Lab	0	0	3	2	60	40	100
3	11UFK629	Machines and Control Systems Lab	0	0	3	2	60	40	100
		Total	18	2	9	26			900
					29				

L-LECTURE T-TUTORIALS P-PRACTICALS CA- CONTINUOUS ASSESSMENT
FE-FINAL EXAM

B.E. ELECTRONICS AND COMMUNICATION ENGINEEEING

(For students admitted during the academic year 2012-13 onwards)

Sl. No	Code	Course	Hours/week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: VII		**THEORY**							
1	11UBK701	Microwave Engineering	3	0	0	3	40	60	100
2	11UBK702	Optical communication	3	0	0	3	40	60	100
3	11UBK703	Engineering Ethics	2	0	0	2	40	60	100
4	11UBE7XX	Elective III	3	0	0	3	40	60	100
5	11UBE7XX	Elective –IV	3	0	0	3	40	60	100
6	11UAK704	Total Quality Management	3	0	0	3	40	60	100
		PRACTICAL							
1	11UBK704	Microwave & Optical communication Lab	0	0	3	2	60	40	100
2	11UBK705	Embedded systems lab	0	0	3	2	60	40	100
3	11UBK706	Project Work Phase – I	0	0	8	4	60	40	100
		Total	17	0	14	25			900
					31				

Sl. No	Code	Course	Hours/week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Semester No: VIII		**THEORY**							
1	11UBK801	Principles of Management	3	0	0	3	40	60	100
2	11UBE8XX	Elective V	3	0	0	3	40	60	100
3	11UBE8XX	Elective VI	3	0	0	3	40	60	100
		PRACTICAL							
1	11UBK802	Project Work Phase – II	0	0	24	12	60	40	100
		Total	9	0	24	21			400
					33				

L-LECTURE T-TUTORIALS P-PRACTICALS CA- CONTINUOUS ASSESSMENT
FE-FINAL EXAM

LIST OF ELECTIVES

(For students admitted during the academic year 2012-13 onwards)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
5th semester						
1.	11UBE501	COMPUTER ARCHITECTURE AND ORGANIZATION	3	0	0	3
2.	11UBE502	INTELLECTUAL PROPERTY RIGHTS (IPR)	3	0	0	3
3.	11UBE503	MEDICAL ELECTRONICS	3	0	0	3
4.	11UBE504	DIGITAL IMAGE PROCESSING	3	0	0	3
5.	11UBE505	COMPUTER HARDWARE AND INTERFACING	3	0	0	3
6th semester						
6.	11UBE601	RISC ARCHITECTURE	3	0	0	3
7.	11UBE602	ADVANCED MICROPROCESSORS	3	0	0	3
8.	11UBE603	INFORMATION THEORY AND CODING	3	0	0	3
9.	11UBE604	GENETIC ALGORITHMS	3	0	0	3
10.	11UBE605	NEURAL NETWORKS AND FUZZY LOGIC	3	0	0	3
11.	11UBE606	NUMERICAL METHODS	3	0	0	3
12.	11UBE607	TELEVISION AND VIDEO ENGINEERING	3	0	0	3
13.	11UBE608	TELEMEDICINE	3	0	0	3
7th semester						
14.	11UBE701	ASIC DESIGN	3	0	0	3
15.	11UBE702	SATELLITE COMMUNICATION	3	0	0	3
16.	11UBE703	RF SYSTEMS AND MEMS	3	0	0	3
17.	11UBE704	CDMA AND OFDM	3	0	0	3
18.	11UBE705	HIGH SPEED NETWORKS	3	0	0	3
19.	11UBE706	IC FABRICATION TECHNIQUE	3	0	0	3
20.	11UBE707	SOLID STATE ELECTRONIC DEVICES	3	0	0	3
21.	11UBE708	NANOELECTRONICS	3	0	0	3
22.	11UBE709	VIRTUAL INSTRUMENTATION	3	0	0	3
23.	11UBE710	ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY	3	0	0	3
8th semester						
24.	11UBE801	MICROWAVE INTEGRATED CIRCUITS	3	0	0	3
25.	11UBE802	OPTO ELECTRONICS AND OPTICAL NETWORKS	3	0	0	3
26.	11UBE803	MOBILE AD-HOC NETWORKS	3	0	0	3
27.	11UBE804	WIRELESS SENSOR NETWORKS	3	0	0	3
28.	11UBE805	ADVANCED RADIATION SYSTEMS	3	0	0	3
29.	11UBE806	RADAR AND NAVIGATIONAL AIDS	3	0	0	3
30.	11UBE807	OPTO ELECTRONIC DEVICES	3	0	0	3
31.	11UBE808	VISUAL CRYPTOGRAPHY	3	0	0	3
32.	11UBE809	MULTIMEDIA COMPRESSION TECHNIQUES	3	0	0	3
33.	11UBE810	REMOTE SENSING AND GIS	3	0	0	3

11USL101 COMMUNICATION SKILLS I

L	T	P	C
3	0	1	3

Course Objectives

- *To improve the language proficiency of the students in English with emphasis on LSRW skills.*
- *To equip the students to study academic subjects with greater facility with theoretical and practical components of the English syllabus.*
- *Enable students to develop their listening skills and to improve their pronunciation.*
- *To make students aware of the role of speaking in English and its contribution to their success.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1 : Utilize basic grammar and its applications.

CO2 : Paraphrase and understand the utilization of the global language.

CO3 : Use the skills of Speaking: Non-Verbal and Verbal Communication.

CO4 : Generate reading skills and techniques involved in it.

CO5 : Rewrite and reorganize the sentences without errors.

UNIT -I LISTENING SKILLS (9)

Listening for general content - Listening to fill up information - Intensive listening-Listening for specific purpose

UNIT- II SPEAKING SKILLS (9)

Introducing oneself in various situations - Describing objects, situation and people Asking questions - Narrating incidents - Just a minute sessions - Day to Day Conversations - Debates

UNIT- III READING SKILLS (9)

Skimming the text - Understanding the gist of an argument - Inferring lexical and contextual meaning - Understanding discourse features - Recognizing coherence/ sequencing of sentences.

UNIT- IV WRITING SKILLS (9)

Paragraph writing - Extended Definition – Transcoding -Formal and informal letter-Note making - Editing a passage- itinerary- instructions.

UNIT -V LANGUAGE FOCUS (9)

Articles – Parts of speech – Tenses – Voice - Gerunds and infinitives – concord- modal verbs- definitions-‘ wh’ questions- comparative adjectives- Conditionals - Nominal compounds - Word formation – Prefixes and Suffixes/ one form to another form - Synonyms and Antonyms

TOTAL HOURS: 45

TEXT BOOKS

1. Department of Humanities and Social Sciences, Anna University ‘English for Engineers and Technologists’, Combined Edition Volume I and II, Chennai: Orient Longman Private Limited, 2006.
2. Murphy, “Murphy’s English Grammar”, Cambridge University Press.

REFERENCES

1. Bhaskaran and Horsburgh, “Strengthen Your English”, , Oxford University Press.
2. Francis Soundararaj, “Speaking and Writing for Effective Business Communication”, MacMillan, India Ltd., 2007.
3. Robert J. Dixon, ‘Everyday Dialogues in English’, Prentice-Hall of India Ltd., 2006.
4. John Seely, ‘The Oxford Guide to Writing and Speaking’, Oxford.

11USM101 **ENGINEERING MATHEMATICS I**

(Common to all branches**)**

L	**T**	**P**	**C**
3	**1**	**0**	**4**

Course Objective

To provide strong foundation to the students to expose various emerging new areas of applied mathematics and appraise them with their relevance in Engineering and Technological field.

PREREQUISITE:

(i) Matrices – rank of matrix, Linear dependence and linear independence

(ii) Differential Calculus – Differentiation of Implicit functions, parametric functions

(iii) Ordinary Differential equations – Basic terminologies like definition, formation, meaning of solution, variable and separable method, linear differential equations.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Identify algebraic eigen value problems, to diagonalizable the matrix which would render eigen solution procedure in a simple manner.

CO2: Analyze effectively the geometrical aspects of curvature, evaluate and envelope concepts as applications of differential calculus.

CO3: Solve the application based problems under the topic such as partial derivate-homogeneous functions, maxima and minima and Jacobians.

CO4: Identify Ordinary Differential Equation problems and enable them to solve higher order.

CO5: Solve ordinary differential equation problems in engineering subjects.

UNIT- I LINEAR ALGEBRA (9)

Euclidean n-space – Vector spaces – Subspaces – Linear combinations – Linear dependence and independences – Basis and dimensions – Applications to matrices: Rank of a matrix, Inner product spaces – Example of inner product spaces – Cauchy-Schwarz inequality– Orthonormal bases – Gram Schmidtt process.

UNIT- II MATRICES (9)

Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation

UNIT- III APPLICATIONS OF DIFFERENTIAL CALCULUS (9)

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes.

UNIT- IV FUNCTIONS OF SEVERAL VARIABLES (9)

Partial derivatives – Total derivatives – Differentiation of implicit functions – Jacobians – Taylor's expansion – Maxima and Minima – Method of Lagrangian multipliers.

UNIT- V ORDINARY DIFFERENTIAL EQUATIONS (9)

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients – Applications to Engineering problems.

TOTAL HOURS: 45 + 15=60

TEXT BOOKS:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 8th Edition, Wiley India, 2006.
2. Grewal. B.S, “Higher Engineering Mathematics”, 40th Edition, Khanna Publications, Delhi, (2007).

REFERENCES:

1. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2007).
2. Glyn James, “Advanced Engineering Mathematics”, 7th Edition, Wiley India, (2007).
3. Jain R.K and Iyengar S.R.K,” Advanced Engineering Mathematics”, 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

11USC103 CHEMISTRY FOR ELECTRICAL SCIENCES

L	T	P	C
3	0	0	3

Course Objective

To provide strong foundation to the students to expose various merging new areas of applied chemistry and appraise them with their relevance in Engineering and technological field.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Demonstrate the concepts and principles of water characterization and treatment methods.

CO2 : Describe the principles of electrochemical phenomena, electrochemical cells and Fuel cells.

CO3: Understand the various types of corrosion and methods of control.

CO4: Understand the various types of fuels and combustion processes.

CO5: Demonstrate the properties and applications of industrially important polymers and their fabrication techniques.

UNIT- I CHEMISTRY IN EVERYDAY LIFE (9)

Applications of Chemistry in health and hygiene – Chemicals in medicines – analgesics, antiseptics, antacids, disinfectants –Chemicals in food preservatives – artificial sweetening agents –Water quality parameter and standards -types of hardness –estimation by EDTA method-characteristic of portable water –domestic water treatment –disinfection methods-Chlorination –UV treatment – Ozonation –desalination –reverse osmosis.

UNIT –II POLYMERS (9)

Introduction – monomers and polymers – Nomenclature of polymers- Classification of polymers- Polymerization-Types- Mechanism of addition polymerization-Plastics-Classification-Compounding of plastics-Preparation, properties and uses of PVC, Teflon Nylon 6,6- Rubber – vulcanization of rubber- Synthetic rubber (Butyl rubber and SBR)-Conducting polymers-Conducting mechanisms.

UNIT-III NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES (9)

Introduction to Energy resources-Primary cell- Lechlanche cell- alkaline batteries -secondary batteries - Lead acid Nickel cadmium and lithium-sulphur batteries- Fuel cells- hydrogen oxygen fuel cell- Solar cells- principles and applications of solar cells- Nuclear energy- nuclear fission and fusion reactions- light water power plant-breeder reactor.

UNIT – IV ELECTROCHEMISTRY AND CORROSION SCIENCE (9)

Electrochemical cells - single electrode potential –Measurement of emf - Reference electrode-standard hydrogen electrode-Calomel electrode - glass electrode and measurement of pH-Corrosion – chemical corrosion- electrochemical corrosion- galvanic corrosion – differential corrosion- Protective coatings –Electroplating of gold - Electroless plating, anodizing-Electrochemical machining of metals and alloys.

UNIT- V ANALYTICAL TECHNIQUES (9)

Laws of absorption- Principles- Instrumentation and applications- UV - Visible spectroscopy- IR spectroscopy- Colorimetry- Estimation of Iron by Colorimetry -Flame photometry- Estimation of Sodium by Flame Photometry- Atomic absorption spectroscopy- Estimation of Nickel by atomic absorption spectroscopy.

TOTAL HOURS: 45

TEXT BOOKS:

1. Jain P.C & Monika Jain, “Engineering Chemistry”, Dhanpat Rai Publishing Co Ltd, New Delhi,2004.
2. Dr. Dara S.S & Dr. Umare S.S., “Engineering Chemistry”, S .Chand & Company Ltd, New Delhi.

REFERENCES:

1. Steven S. Zumdahl and Susan A. Zumdahl “Chemistry” Houghton Mifflin, Seventh Edition 2009.
2. Kaiser A.B, “Electronic properties of conjugated polymers – basics, models and applications”, Springer Verlag,(1997).
3. Dr. Ramachandran T, Dr Venkataraman H, Dr. Magudeswaran P N, “Chemistry for Engineers”, Vijay Nicole imprints Private Limited, Chennai.

11USP103 PHYSICS FOR ELECTRICAL SCIENCES

L	T	P	C
3	0	0	3

Course Objective:

To provide strong foundation to the students to expose various emerging areas of Applied Physics and appraise them with their relevance in Engineering and technological field.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Understand the concepts of Laser, types and apply those concepts in engineering and technology.

CO2: Understand the principle behind the optical fiber and classify the optical fiber.

CO3: Demonstrate the behavior of quantum particle and write the concepts involved with different microscopes.

UNIT- I LASER TECHNOLOGY AND FIBER OPTICS (9)

Introduction, Principle–Spontaneous emission, Stimulated emission, Population Inversion, Pumping mechanisms- Types of Laser– He-Ne Laser, CO_2, Semiconductor Laser. Applications –Lasers in Microelectronics, Drilling, Welding, Heat Treatment, Cutting and Holography. Principle, Modes of Propagation, Fabrication Techniques–Rod & Tube method, Crucible-Crucible Technique - Classification based on Materials, Refractive Index Profile and Modes. Splicing, Losses in Optical fiber. Light Sources for fiber Optics. Detectors, Fiber Optical Communication links.

UNIT- II QUANTUM PHYSICS AND MICROSCOPY (9)

Development of quantum theory, Dual Nature of Matter and Radiation – de-Broglie wavelength, Uncertainty Principle, Schrodinger equation – Time dependent, Time independent. Particle in a box. Limitation of Optical Microscopy, Electron Microscopy, Transmission Electron Microscope, Scanning Transmission Electron Microscope and Application

UNIT- III ELECTRICAL AND THERMAL PROPERTIES (9)

Electrical conductivity – Drude – Lorentz theory of metals (qualitative). Wiedmann-Franz law. Origin of band structure – band theory of solids, distinction between conductors, semiconductor and insulator based on band theory. Factors affecting resistivity of metals – Temperature, alloying, strain and magnetic filed with respective applications. Thermal conduction – Thermal conductivity, Flow of heat through compound media.

UNIT- IV SEMICONDUCTING MATERIALS AND DEVICES (9)

Elemental and compound semiconductors, Intrinsic and extrinsic semiconductors – Properties. Carrier concentration in intrinsic semiconductors. Carrier concentration in n-type and p-type semiconductors. Material preparation – Czochralski method and zone refining, doping methods (diffusion and ion implantation) Hall Effect in extrinsic semiconductors, Solar cells, IC fabrication

UNIT -V MAGNETIC MATERIALS AND DEVICES (9)

Dia, Para, Ferro, Antiferro and ferri magnetic materials – Properties, Heisenberg and domain theory of ferromagnetisms. Hysteresis, Ferrites – Structure, preparation and its applications – CD ROM, Magneto optical recording.

TOTAL HOURS:45

TEXT BOOKS:

1. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi, 2005.
2. William D Callister, Jr "Material Science and Engineering" John wiley and Sons, New York, 2007.

REFERENCES:

1. Jayakumar, S "Materials Science", RK Publishers, Coimbatore 2006.
2. Richard Wolfson, "Essential University Physics", Pearson Education ,Volume I & II
3. Ageov N, Zuev A.I and Kokora A, "Laser and Electron Beam materials processing", Mir Publications, Moscow, 1998.

11UCK102 FUNDAMENTALS OF COMPUTING & C PROGRAMMING

L	T	P	C
3	0	0	3

Course Objectives

To know the categories of software in day to day life

- *To learn the control structures of C language*
- *To write programs using Functions & Pointers*
- *To use different data types and multi-dimensional arrays in programs*
- *To write programs using structures and files*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Recognize the fundamentals of computer and its organization.

CO2: Develop algorithms and pseudocodes for a given problem, infer the usage of Internet.

CO3: Identify the data types and use control structures for developing programs.

CO4: Write programs using arrays, functions, structures and unions.

CO5: Apply the concepts of files and pointers in developing programs.

UNIT – I INTRODUCTION TO COMPUTERS (9)

Introduction- Characteristics of Computers- Applications of Computers-Computer Software and Types of Software- Relationship between Software and hardware- Software Terminology

UNIT – II PROBLEM SOLVING (9)

Software Development Steps - Algorithm-Flowchart-Pseudo code (P-Code)- Different Programming Paradigms

UNIT – III INTRODUCTION TO C (9)

Introduction to C–- tokens: identifier-constant-keyword—data types- operators and Expressions- Managing Input and output operations

UNIT – IV CONTROL STATEMENTS, ARRAYS & POINTERS (9)

Decision making and branching –conditional Looping – unconditional Looping- Introduction to Arrays - manipulation of Arrays- Introduction to Pointers- Dynamic memory allocation

UNIT – V FUNCTIONS & STRUCTURES (9)

Introduction to function—call by value - call by reference- Introduction to structures – array of structure - Pointer to structure–Self referential structures- Union.

TOTAL HOURS: 45

TEXT BOOKS

1. Yashavant P. Kanetkar, "Let Us C", BPB Publications, 10th Edition, 2009
2. B.W.Kernighan, Dennis M. Ritchie,"The C Programming Language", Pearson Education, 2003
3. Ashok.N.Kamthane, "Computer Programming", Third Impression, Pearson Education(India), 2008.

REFERENCES

1. Samuel P. Harbison Ill, Guy L. Steele Jr., "C – A Reference Manual", Pearson Education, 5th edition, 2008.
2. Byron S. Gottfried, "Schaum's outline of theory and problems of programming with C", McGraw – Hill Professional, 1996.
3. V. Rajaraman, "Fundamentals of Computers", Fourth Edition, Prentice Hall of India Private Limited, 2007

11UBK102 (R) **ELECTRON DEVICES**

L	T	P	C
3	0	0	3

Course Objectives

- *The students will understand the constructional features and characteristics of various electronic devices and circuits.*
- *The subject aims to introduce most of the basic electronic devices and discuss about the functioning, application and selection of appropriate devices to design a circuit for a particular application.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Illustrate the concepts of Electron Ballistics and semiconductor theory.
CO 2: Describe the operation of semiconductor diodes and its applications.
CO 3: Describe the working principle and characteristics of BJT and compute the performance.
CO 4: Describe the working principle and characteristics of FET and UJT.
CO 5: Explain the working principle of special semiconductor devices with its applications.

UNIT –I PN JUNCTION DIODES (9)

Theory of PN junction diodes - Drift and Diffusion current – Volt– Ampere characteristics – Static and dynamic resistance – Effect of temperature on diodes – Transition and diffusion capacitance –Avalanche and Zener break down – Zener diode characteristics-Zener diode as a voltage regulator -Tunnel diode - Varactor diode - PIN diode.

UNIT –II BIPOLAR JUNCTION TRANSISTOR (9)

Principle of transistor action–Current components–Cutoff, active and saturation region–Input and output characteristics–CE, CB, & CC Configurations, Transistor as a switch and amplifier-comparison of amplifier configuration

UNIT –III FIELD EFFECT TRANSISTOR (12)

Types-Comparison of FET and BJT-Characteristics and principle of operation of JFET-JFET parameters - JFET as an amplifier, switch and variable resistor- CS, CD, CG configurations – MOSFET – principle of operation- Depletion and enhancement modes – Output and transfer characteristics

UNIT –IV SCR AND UJT (8)

SCR families- two transistor model – TRIAC – DIAC -operation – characteristics – analysis – applications- UJT – operation – characteristics – equivalent circuit and applications

UNIT –V OPTO ELECTRONIC DEVICES (8)

Fundamentals of light–Photoconductive, Photovoltaic, Photo emissive sensors-Photo diodes-PIN photo diode–Avalanche photo diode-Phototransistors–LED-LCD-LDR-Laser diodes - Solar cells

TOTAL HOURS: 45

TEXT BOOKS

1. Millman Jacob, Christos Halkias, Satyabrata Jit, "Electronic Devices and Integrated Circuits", McGraw Hill, 2010.
2. Floyd T.L., "Electronic Devices and Circuits", Pearson Education, 6th edition, New Delhi, 2003

REFERENCES

1. Boylstead R.L and Nashelsky L, " Electronic Devices and Circuit Theory", Pearson Education, eighth edition, 2010.
2. David A. Bell, "Electronic Devices & Circuits", 4th Edition, Prentice-Hall India, 2007.
3. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2007.

11UBK101 HISTORY OF ELECTRONICS AND COMMUNICATION ENGINEERING

L	T	P	C
1	0	0	1

Course Objectives

At the end of the course, student should be able to know

- *Fundamentals of electronics, History and evolution of electronic devices*
- *Basics of digital electronics, Various phases in Communication technology*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Introduce Fundamentals of electronics like charges devices wave and quantum theory.

CO 2: Study of History and evolution of semiconductor devices, Micro controllers & embedded processors.

CO 3: Introduction of Basics of digital electronics like number system, Boolean Algebra & logic Gates

CO 4: Study of Various phases in Communication technology, Wired & Wireless communication Techniques & different generations of wireless communication networks.

ELECTRONICS

Fundamentals: Basic theory on charges (current, voltage, power, static & dynamic) - Basics of active and passive devices - Cathode Rays & Electron Revolution in physics by emergence of the quantum theory – Electrons and Waves by Boltzmann & Planck – History of Transistor by John Bardeen.-Discovery of Vacuum tubes- Cathode Ray Oscilloscope(CRO)- Digital Multimeters

Digital Fundamentals: Analog and digital systems, Number system – Boolean algebra – logic gates - semiconductor memory –ICs- microprocessor – digital computer principles.

Recent Technology: Evolution (LSI, MSI VLSI) – CMOS Techniques– Microcontrollers - Embedded systems - Embedded processors **–** Nano technology

COMMUNICATION

History of Communication: Electromagnetic spectrum - Types of Communication (Analog, Digital)- Transmitter, Receiver & Channel (Wired and wireless Channel) - Antenna, Noise, Generations of wireless communication (1G,2G,2.5G,3G,4G)

Wired & Wireless Communication: Telegraph, Telephone, Power line communication - Microwave & Fiber Optic communication, Satellite & Radar Communication, Radio and TV, Walkie-Talkie, Paging systems, Cordless phones, ISDN and Advanced intelligent networks - Internet , Bluetooth, Wi-fi, WLL.

TOTAL HOURS: 15

REFERENCES

1. Michael Woods, Mary B. Woods, “The history of communication”, Lerner Publishing Group, 2008
2. Dennis Roddy and John Coolen, “Electronic Communication”, PHI, 1(9)(9)5
3. Theodore S. Rappaport ,”Wireless Communications” Pearsons Education Ltd
4. Albert Paul Malvino, Donald P Leach, “Digital Principles and Applications”, Tata McGraw Hill, IV Edition, 1(9)(9)1

5. Neil H. E. Weste and Kamran Eshraghian," Principles of CMOS *VLSI* Design", Second Edition, Addison Wesley, 2006
6. http://www.ece.umd.edu/~taylor/Electrons.htm
7. http://en.wikipedia.org/wiki/Electronics
8. http://nanotechnology.cm/introduction-to-nanotechnology-54/

11USH111 **PHYSICAL SCIENCE LABORATORY I**

L	T	P	C
0	0	3	1

AIM

To provide exposure to the students with hands-on experience on scientific equipments

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Determine the wavelength of the laser, the wavelength of spectral line in the mercury spectrum and using laser, to calculate the size of the particle and numerical aperture of an optical fiber.

CO 2: Determine the thickness of thin wire using an optical instrument

CO3: Analyze the various water quality parameters quantitatively.

CO4: Estimate the various ions based on conductivity measurement.

CO5: Estimate the various ions by spectrophotometric method.

PHYSICS LABORATORY I

1. a) Particle size determination using diode laser.
b) Determination of laser parameters – Wavelength and angle of divergence
c) Determination of acceptance angle in an optical fiber.
2. Determination of Band gap of a Semi conducting material.
3. Characteristics of LDR
4. Determination of thermal conductivity of a bad conductor – Lee's disc method.
5. Determination of Hysteresis Loss of a Ferro-magnetic material.
6. Determination of Young's modulus of the material – Non uniform bending.

DEMONSTRATION:

1. Optical phenomena using Laser.

CHEMISTRY LABORATORY-I

1. Determination of pH of strong acid by pH metry
2. Conductometric titration of strong acid with strong base.
3. Estimation of HCL and CH3COOH by Conductometric titration.
4. Potentiometric titration of Ferrous ion using Potassium dichromate.
5. Determination of Electrode Potential of an electrode.
6. Estimation of Iron by Spectrophotometry**.**

TOTAL HOURS: 30

11UCK105 COMPUTING AND C PROGRAMMING LAB

L	T	P	C
0	0	3	2

Course Objective

- *To gain mastery over the C language*

List of Programs / Experiments can be setup by the faculty with the following

1. Programming concepts involving I/O statements.
2. Programming concepts involving conditional statements.
3. Programming concepts involving looping statements.
4. Programming concepts involving functions.
5. Programming concepts involving Arrays (1D, 2D).
6. Programming concepts involving Pointers.
7. Programming concepts involving Dynamic Memory Allocation
8. Programming concepts involving Structures.
9. Programming concepts involving Self Referential Structures.

Note: The above programs will be tuned to the various fundamental principles in the specific engineering branches

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Write C programs using control and looping statements.

CO2: Write C programs using string functions.

CO3: Design and use user defined functions in C programs.

CO4: Design and develop C programs using structures.

CO5: Implement C programs using the concept of pointers.

TOTAL HOURS: 30

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

HARDWARE

LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
Printers – 3 Nos.

SOFTWARE

OS – Windows / UNIX Clone

11UAK105 ENGINEERING PRACTICES LAB

L	T	P	C
0	0	3	2

Course Objectives

- *To provide fundamental knowledge and hands on experience to the students on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Perform the operations such as planning, sawing, and chiseling to firmly fix the wooden blanks using the desired joints.

CO2: Join the metal pieces by welding process using the welding equipment.

CO3: Relate the tools and processes to form the simple sheet metal components by developing the surface layouts.

CO4: Analyze the safety aspects, types of valves, taps, tools in plumbing, prepare threading, cutting and to design connection to service line using PVC and GI pipes.

CO5: Recognize the safety aspects in electrical wiring and its components and construct the basic electrical wiring circuits.

GROUP A (MECHANICAL & CIVIL)

MECHANICAL ENGINEERING PRACTICE

Sheet Metal: Study of tools, equipments and safety precautions, Different types of joints - knocked up, double grooving joints, Model making –Tray and Funnel.

Welding: Arc welding practice - butt joint, lap joints and tee joints, Demonstration of gas welding.

CIVIL ENGINEERING PRACTICE

Plumbing: Preparation of plumbing line sketches for (i) water supply lines (ii) sewage lines, Cutting and threading of PVC pipes**,** Basic pipe connection using valves, taps, couplings, unions, reducers, elbows in household fitting.

Wood Work: Sawing, planning, making common joints like T joint, dovetail joint, etc. using power tools, Study of joints in door panels and wooden furniture.

Basic Construction Tools: Demonstration of power tools like rotary hammer, demolition hammer, hand drilling machine, etc.

GROUP B (ELECTRICAL & ELECTRONICS)

ELECTRICAL ENGINEERING PRACTICE

Safety aspects of electrical wiring, Basic household wiring using switches, fuse, indicator-lamp, etc., Preparation of wiring diagrams, Stair case light wiring, Tube – light wiring, Calculation of power and energy, Study of iron-box, fan with regulator.

ELECTRONICS ENGINEERING PRACTICE

Study of CRO and multimeters- Soldering simple electronic circuits and checking continuity, Assembling electronic components on a small PCB and testing, Study of logic gates, Study of telephone, FM radio and low-voltage power supplies.

Examination Pattern: The Examination is to be conducted for both groups A & B, allotting 1½ for each group.

TOTAL HOURS :45

11USL201 COMMUNICATION SKILLS II

L	T	P	C
3	0	1	3

Course Objectives:

- *To enable the students to understand the meaning and the importance of communication*
- *To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions*
- *To enhance the written communication in business context*
- *To make students confident to express themselves fluently and appropriately in social and professional contexts*
- *To develop an awareness in the students about writing as an exact and formal Skill.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Apply grammatical knowledge which increases speaking and writing skills.
CO2: Utilize listening skills to receive the information and take timely decisions.
CO3: Use speaking skills to communicate well and to handle the man power in order to develop inter-personal skills.
CO4: Develop reading and writing skills in the professional career.
CO5: Enhance critical thinking and thereby develop problem solving skills

UNIT- I BASIC COMMUNICATION THEORY (9)

Importance of communication -Stages of communication - Modes of communication - Barriers to Communication - Difference between Verbal and Non Verbal communication - Body Language - Psychological and cultural influence on communication

UNIT- II LISTENING AND ANALYSIS (9)

Listening to technical and Non technical material - Intensive listening - Note taking - Cloze Listening - Listening and interpreting the missing texts - Listening to lectures and speeches - Listening to discussions and explanations - Telephonic listening

UNIT- III BUSINESS CORRESPONDENCE (9)

Report writing - Recommendations - Memoranda – Notice - Minutes of meeting - Letters and Emails (pertaining to business situations) - Resume and Job applications- advertisements- checklists- technical essays.

UNIT -IV ORAL COMMUNICATION (9)

Basics of Phonetics - Presentation Skills - Role-plays - Group Discussions - Short Extempore - Debates - Conversation Practices

UNIT -V LANGUAGE FOCUS (9)

Introduction to technical writing - spelling - Error detection – cause and effect- structures expressing purposes- prepositions- sequencing of words- Punctuation - Idioms and phrases - American and British Words - One word Substitutes (Technical) - Foreign Phrases

TOTAL HOURS:45

TEXT BOOK:

1. Asraf M Rizvi, "Effective Technical Communication" Tata McGraw.2005
2. Department of Humanities and Social Sciences, Anna University 'English for Engineers and Technologists', Combined Edition Volume I and II, Chennai: Orient Longman Private Limited, 2006.

REFERENCES

1. Boove, Counter R et al “Business Communication Today”, Pearsons Education,2002.
2. Jod O connor, “Better Pronunciation”, Cambridge Paperback, 2008.
3. Meenakshi Raman, “Technical Communication Principle and Practice”, OUP 2007.

11USM201 **ENGINEERING MATHEMATICS II**

(Common to all branches**)**

L	**T**	**P**	**C**
3	**1**	**0**	**4**

Course Objective:

To provide strong foundation to the students to expose various emerging new areas of applied mathematics and appraise them with their relevance in Engineering and Technological field.

PREREQUISITE:

i) Three dimensional analytical geometry – Direction cosines and Direction ratios, equation of straight line and plane.

ii) Integration – Evaluation of single integrals – Definite integrals and its properties.

iii) Vector algebra – position vector – Dot and Cross product – Properties.

iv) Definition – examples – Modulus and amplitude form – Demoivre's theorem – properties of complex variable.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Compute double and triple integration using Cartesian and polar coordinates.

CO2: Understand effectively the vector calculus concepts and using them to find the area and volume of three dimensional problems.

CO3: Understand the application based problems under the topic such as complex variables, conformal mapping and bilinear transformation.

CO4: Understand the concepts of the integration and solve the problems using Cauchy's integral and residue theorems, also able to solve contour integration.

CO5: Understand the concepts of Laplace Transforms and inverse Laplace Transforms and solve the differential equations using Laplace Transforms.

UNIT- I THREE DIMENSIONAL ANALYTICAL GEOMETRY (9)

Equation of a sphere – Plane section of a sphere – Tangent Plane – Equation of a cone –Right circular cone – Equation of a cylinder – Right circular cylinder.

UNIT- II INTEGRAL CALCULUS (9)

Double integration – Cartesian and polar coordinates – Change of order of Integration – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral –Beta and Gamma integrals – Properties – Simple problems.

UNIT -III VECTOR CALCULUS (9)

Gradient – Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration: Green's theorem in a plane – Gauss divergence theorem – stokes' theorem(excluding proofs) – Simple applications involving cubes and rectangular parallelepiped**.**

UNIT- IV COMPLEX VARIABLES (9)

Functions of a complex variable – Analytic functions – Necessary conditions and Sufficient conditions(excluding proofs) – Cauchy - Riemann equation – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: $w = c+z$, $w = cz$, $w = 1/z$ and Bilinear Transformation.

UNIT- V COMPLEX INTEGRATION (9)

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Cauchy's and Jordan's Lemma(statement only) – Classification of singularities – Calculus of residues – Residue theorem – Application of residue theorem to evaluate real integrals along unit circle and semi-circle.

TOTAL HOURS: 45 + 15=60

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley India, 2006.
2. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, (2007).

REFERENCES:

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2007.
2. Glyn James, "Advanced Engineering Mathematics", 3rd Edition, Wiley India, 2007.
3. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., 2007.
4. George, B Thomas J.R. and Ross L. Finney, "Calculus and Analytical Geometry", 10^{th} edition, Addison Wesley, 2000.

11USC201 ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
3	0	0	3

Course Objective:

To learn the basics and create awareness of environment and ecology. To know about the role of an individual in preserving the natural resources and about the various legislations, acts and NGO's that aims to control pollution

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Understand the various segments of planet earth and control measures for different types of pollution which affects the environment.

CO2: Distinguish on various natural resources and the need for its conservation.

CO3: Demonstrate the features of various ecosystem and values of Biodiversity and its conservation.

CO4: Understand the needs for sustainable development, various environmental acts and ethics.

CO5: Understand the various problems due to the population explosion and the need to promote value based education.

UNIT-I ENVIRONMENT & ECOSYSTEM (9)

Introduction – Components of the environment – People, society and environment – Need for public awareness – Scope and importance – Environmental problems and sustainable development. Ecosystem – Concept – Ecosystem degradation – Structure and functions of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Water cycle – Carbon cycle – Oxygen cycle – Nitrogen cycle – Energy cycle – Food chain – Food web – Ecological pyramid – Types of ecosystem – Forest – Grassland – Desert – Aquatic ecosystem-Case Studies in current scenario.

UNIT –II BIODIVERSITY & NATURAL RESOURCES (9)

Biodiversity – Introduction – Ecosystem, Species & Genetic diversity – Biogeographical classification of India – Value of biodiversity – Hotspots of biodiversity – Threats to biodiversity – Conservation of biodiversity. Resources – Introduction – Renewable & Non-renewable resources – Forest resource – deforestation – timber extraction – Water resources – Flood – Drought – Dam – Conflict over water – Food resource – Changes & effects by modern agricultural practices – Overgrazing – Land resource – landslide – Biomass – Some non-renewable sources–Mineral resources–Alternate energy sources-Case Studies in current scenario.

UNIT – III POLLUTION (9)

Pollution – Classification of pollutants – Cause, Source, Effect and Control measures - Air pollution – Causes, types & sources of air pollutant – Effect of air pollutants – Control of air pollution – Water pollution – Source and effects - Thermal pollution – Radioactive pollution – Marine pollution – Pesticidal pollution – Groundwater pollution – Land pollution – Sources and effects of soil pollutant – Solid waste – Methods of solid waste disposal– oil degradation – Solid waste management–Recovery and conversion methods–Noise pollution–Sources, effects and control measures–An Introduction to E-Waste Management- Case Studies in current scenario.

UNIT – IV LEGAL ACTS & MAJOR ENVIRONMENTAL CONCERNS (9)

Environmental legislations – Acts – Water act – Air act – Environment act – Land act – Wildlife protection act – Forest acts – Functions of CPCB & SPCB. Water conservation – Rainwater harvesting – Reducing water demand – Watershed management. Disaster – Tsunami – Bhopal gas disaster – Minamata tragedy – Polythene – Disaster management – Nuclear accident – Flood, Earthquake, Cyclone and Landslide. Major issues in environment – Climate change, Global warming, Acid rain and Ozone layer depletion- Case Studies in current scenario.

UNIT – V HUMAN POPULATION & ENVIRONMENT (9)

Population - Population explosion – Effects of population growth on resources – Urbanization - Family welfare programme – Environment and human health – Climate & health, Infectious & water related diseases, Cancer & environment – Human rights – Equity – Nutrition, health and human rights – HIV/AIDS – Women and child welfare - Role of information technology in protecting the environment – Role of individual in the prevention of pollution – Role of NGO's in protecting the environment- Case Studies in current scenario.

TOTAL HOURS=45

TEXT BOOKS:

1. Anubha Kaushik and C P Kaushik 'Environmental Science and Engineering' Third Edition, New age International(P) Limited, Publisher 2008. New Delhi
2. Aloka Debi, "Environmental Science and Engineering", Universities Press, 2008.

REFERENCES:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006. (UNIT – 4: Major issues in environment)
2. Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', Second Edition, Pearson Education, 2004.
3. Tyler Miller, Jr., 'Environmental Science, Brooks/Cole a part of Cengage Learning, 2006.

11USP202 SCIENCE OF ENGINEERING MATERIALS

(Common to all circuit branches)

L	T	P	C
3	0	0	3

Course Objective:

To give an exposure to the Students on materials and their applications in the field of Technology, and also to create awareness towards the impact of the materials.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1. Identify the different type of crystal structures.

CO2. Outline the various types of Composites, properties and their applications.

CO3. Study about dielectric materials & their properties & its classifications.

CO4. Understand properties of Bio materials & their applications.

UNIT- I CRYSTAL STRUCTURE (9)

Definition of a Crystal–Crystal classification- Unit Cell–Bravais Lattice–Miller Indices–Bragg's Law–Determination of Crystal structure by Debye Scherrer method-Crystal imperfections–Point, Line and Surface imperfections - Burger Vector

UNIT-II COMPOSITIES (9)

Introduction, Features and benefits, structural characteristics, manufacturing techniques, Function of matrix and Reinforcement in composites. Classification of composites based on reinforcement, Types of composite materials. Applications.

UNIT- III DIELECTRIC MATERIALS AND DEVICES (9)

Definition of dielectrics. Electric dipole moment. Electric polarization. Dielectric constant. Electric susceptibility. Polarisation mechanisms – Electronic, Ionic, Orientation and Space charge polarization. Variation of dielectric constant with temperature and frequency. Dielectric breakdown - Dielectric Breakdown mechanisms. Classification of insulators on temperature basis. Capacitance and transducer.

UNIT- IV ADVANCED MATERIALS: (9)

Shape Memory Alloy (SMA)–Characteristics, Properties of NiTi alloy, Application, Advantages and Disadvantages of SMA. Superconductivity–Types of superconductors High Tc Superconductors, Comparison with low Tc superconductors. Application of Superconductors, Metallic glasses – Preparation, Properties and Applications

UNIT- V BIO MATERIALS (9)

Definition and classification of biomaterials. Construction materials, Impact of biomaterials. Mechanical Properties – wound healing process. Tissue response to implants. Safety and efficiency testing. Bio-compatibility. Biodegradable ceramics – Biodegradable synthetic polymers. Silicone rubber. Plasma polymerization. Micoorganism in polymeric implants. Bio polymers. Polymer sterilization.

TOTAL HOURS:45

TEXT BOOKS :

1. William D Callister, Jr "Material Science and Engineering" John wiley and Sons, New York, 2007
2. Shaffer, J.P.Saxena, A, Antolorich, S D Sanders Jr. T.H. and Warner S.B., "The Science and Design of Engineering Materials", The McGraw Hill Co. Inc, New York 1999

REFERENCES:

1. Jayakumar, S “Materials Science”, RK Publishers, Coimbatore 2006.
2. Raghavan, V. “Materials Science and Engineering – A First Course” Prentice Hall of India, New Delhi 2004.
3. James F Shackelford S, “Introduction to Materials Science for Engineers”, Third Edition, Macmillan Publishing Company, Newyork, 1992.

11UFK221 (R) BASICS OF ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives

- *To familiarize the students with the concepts based of electrical engineering.*
- *To introduce the fundamentals of transformers and electrical motors.*
- *To introduce the fundamentals of power generation and transmission techniques*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1 The principles of electromechanical energy conversion applied in both motor and generator are studied.

CO 2: Describe the constructional and operational details of D.C. motors and D.C generators, and their characteristics.

CO 3: The constructional and operational details of single and three phase induction motors are learnt .

CO 4 The constructional and operational details of synchronous machines are analysed.

CO 5: Various power generation techniques are being introduced to the students. Structure and function of power distribution system is dealt. Introduction into power electronic devices is done..

UNIT –I DC MACHINES AND TRANSFORMERS (9)

Construction of DC machine-excitation- EMF equation- types of generators - Characteristics of DC generators – Principle of operation of D.C. motor-Torque equation- Characteristics transformers-applications- EMF equation- Construction

UNIT -II INDUCTION MOTORS AND SYNCHRONOUS MACHINES (9)

Construction – Types of rotors – Principle of operation of three-phase induction motor, Single-phase induction motors and synchronous machines– performance characteristics

UNIT –III POWER GENERATION SYSTEMS (9)

Structure of power generation systems – various types– Diesel, Thermal, Hydro, Gas , Nuclear power plants- Layout & operation

UNIT –IV POWER TRANSMISSION AND DISTRIBUTION SYSTEMS (9)

Structure of power transmission and distribution systems-EVAC transmission systems- EVDC transmission systems- Substation layout- insulators and cables

UNIT -V POWER ELECTRONICS (9)

SCR characteristics – Single-phase half and fully controlled SCR rectifiers –Introduction to chopper and their types.

TOTAL HOURS: 45

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill publishing company ltd, second edition, 2007 (Reprint).
2. V.K.Mehta,”Principle of Power systems”, S-Chand and Company Ltd,2000.

REFERENCES

1. S.K.Bhattacharya, “Electrical Machines”, Tata McGraw Hill Publishing company ltd, Second edition, 1998
2. V.N.Mittle, Arvind Mittle-”Basic Electrical Engineering”, TMH New Delhi-Second Edition, 2007
3. V.K.Mehta,”Principle of Electrical Engineering”, S-Chand and Company Ltd,2000
4. P.S. Bimbhra,” Power electronics’, Khanna Publications, Third Edition, 2003

11UBK202 CIRCUIT THEORY

L	T	P	C
3	1	0	4

Course Objectives

- *To familiarize the students with concepts related to network reduction, network theorems, resonance and transient response.*
- *To introduce network theorems (DC & AC), resonance and its characteristics.*
- *To introduce the concept of graph theoretic approach.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Summarize the circuit elements, circuit's laws and reducing the network.

CO 2: Describe the concepts of active, reactive and apparent power and power factor.

CO 3: Solve the electrical network by using network theorems.

CO 4: Illustrate the concepts of resonance and coupled circuits.

CO 5: Analyze the transient response of series and parallel A.C circuits.

UNIT -I BASICS OF CIRCUIT ANALYSIS (DC analysis only) (9)

Ohm's Law - Kirchoff's current law – Kirchoff's voltage law – Single loop circuit – Single node pair circuit – series and parallel connected sources – resistors in series and parallel – Voltage and current division– nodal analysis – mesh analysis – Source transformation – delta wye conversion.

UNIT -II NETWORK THEOREMS (9)

Thevenin and Norton theorem, maximum power transfer, superposition theorem, Reciprocity theorem, compensation theorem, Millman's theorem, Tellgen's theorem.

UNIT –III TRANSIENTS (9)

Capacitor–inductor–energy storage–RL, RC, RLC Circuits, DC transient and steady state response-Laplace transforms in solving differential equations for complete response in RL, RC and RLC Circuits.

UNIT –IV RESONANCE AND COUPLED CIRCUITS (9)

Phasor relationship for R, L and C – impedance – admittance, series resonance – parallel resonance – their frequency response, bandwidth and quality factor – Self inductance – Mutual inductance – Coupling coefficient- Tuned Circuits.

UNIT –V DUALITY AND TOPOLOGY (9)

Concept of duality, dual network, Graph's of a network, trees, Chords and branches, Tie set and cutest of a graph.

TOTAL HOURS: 60

TEXT BOOKS

1. William H.Hayt, Jv Jack E.Kemmerly and Steven M. Durbin," Engineering Circuits Analysis", Tata Mc.Graw Hill ,6th edition, 2002.
2. Sudhakar.A and Shyam mohan.SP "Circuits and Network analysis & synthesis" Tata Mc Graw Hill (2007)

REFERENCES

1. Schaum's series, "Basic Circuit Analysis ", Mc Graw Hill, Second Edition, 1998
2. K.V.V. Murthy and M.S Kamath , Basic Circuit Analysis , Jaico Publishing House, 2009 (Reprint)
3. Norman Balabanian , "Electrnic Circuits", Mc Graw Hill Intenational edition, 1994
4. David E. Johnson, Johnny R.Johnson, John L.Hilliburn and Peter D. Scott, "Electric Circuit Analysis", Prentice Hall International ,Third Edition, 1997.

11USH211 PHYSICAL SCIENCE LABORATORY II

L	T	P	C
0	0	3	1

AIM

To provide exposure to the students with hands-on experience on scientific equipments

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Understand the electrical and thermal property of the materials and to determine the efficiency of a silicon solar cell.

CO2: Evaluate the velocity of ultrasonic waves in the liquid medium, refractive index of the liquid and the co-efficient of viscosity of the liquid.

CO3: Calculate the modulus of elasticity using cantilever, non-uniform bending & torsional pendulum methods.

CO4: Estimate the various elements present in the industrially important alloys.

CO5: Determine the metal ion using instrument working on redox system.

PHYSICS LABORATORY II

1. Comparative resistivities of alloy and metal – Meter Bridge.
2. Determination of efficiency of a solar cell.
3. Characteristics of photodiode.
4. Determination of lattice constant X-ray powder photograph.
5. Determination of Rigidity modulus- Torsion Pendulum
6. Determination of Young's modulus of the material – Non uniform bending
7. Determination of Velocity of Ultrasonic waves – Ultrasonic Interferometer

CHEMISTRY LABORATORY - II

1. Estimation of hardness of water by EDTA method.
2. Estimation of Calcium ions and Magnesium ions by EDTA method.
3. Estimation of alkalinity of water sample.
4. Determination of Chloride in water by Argentometric method.
5. Determination of Dissolved Oxygen in waste water using Winkler's titrimetry method.
6. Estimation of copper in brass by EDTA.

TOTAL HOURS: 30

11UBK203 **DEVICES AND CIRCUITS LAB**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Construct and verify the circuit's laws and theorems for the given circuit.

CO 2: Compute the current and voltage of the circuit using mesh and nodal analysis.

CO 3: Construct and verify the operation of semiconductor diode characteristics experimentally.

CO 4: Compute the performance parameter graphically for BJT, JFET, MOSFET, UJT, SCR.

1. Verification of Kirchoff's Voltage and Current laws.
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem
4. Verification of Maximum Power Transfer theorem
5. Verification of Reciprocity Theorem
6. PN diode characteristics
7. Zener diode characteristics and Voltage Regulator
8. Transistor Characteristics (CE Configuration)
9. JFET Characteristics (Common source configuration)
10. SCR as an amplifier and switch

TOTAL HOURS: 30

11UAK103/11UAK203 ENGINEERING GRAPHICS LAB

L	T	P	C
1	0	3	3

Course Objectives

• To develop in students graphic skill for communication of concepts, ideas and design of engineering products.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Construct the special curves such as various conical sections, Cycloids and involutes, relating them with engineering applications.

CO2: Draw the orthographic projections of points and lines located in the first quadrant.

CO3: Make projections of solids, sectional views and development of surfaces of simple solids.

CO4: Construct the orthographic views from pictorial view of objects by free hand sketching.

CO 5: Demonstrate the construction of 2D models using appropriate modeling software packages.

UNIT –I CURVES USED IN ENGINEERING PRACTICES [FREEHAND SKETCHING AND 2D SOFTWARE] (9)

Conics – Construction of ellipse, parabola and hyperbola by eccentricity method–Construction of cycloid – Involutes – Drawing of tangents and normal to the above curves.[Freehand]
Importance of 2D drafting – sketching, mirroring, scaling, copying and dimensioning – practice of computer aided drafting using appropriate software packages.

UNIT –II ISOMETRIC TO ORTHOGRAPHIC AND ORTHOGRAPHIC TO ISOMETRIC VIEWS [FREEHAND SKETCHING AND 2D SOFTWARE] (9)

General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – drawing of multiple views from pictorial views of 3D objects using 2D software. Principles of isometric projection – Free hand sketching of isometric views from orthographic views.

UNIT –III PROJECTION OF LINES AND PLANE SURFACES [2D SOFTWARE] (9)

Projection of straight lines located in the first quadrant and inclined both planes – Concept of true lengths and true inclinations of lines. Projection of polygonal surface and circular lamina inclined to any one reference plane.

UNIT –IV PROJECTION OF SOLIDS [2D SOFTWARE] (9)

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT –V SECTIONING OF SOLIDS AND DEVELOPMENT OF SURFACES [2D SOFTWARE] (9)

Sectioning of solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other (Obtaining true shape is not required). Development of lateral surfaces of prisms, pyramids, cylinders, cones and truncated solids.

TOTAL HOURS: 15 +45= 60

TEXT BOOKS

1. N.D. Bhatt, “Engineering Drawing”, Charotar Publishing House, 46th Edition, 2003.
2. Modeling software packages like Solid edge, Unigraphics and Auto CAD

REFERENCES

1. Dhananjay A.Jolhe, “Engineering Drawing with an introduction to AutoCAD” Tata McGraw Hill Publishing Company Limited, 2008.
2. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. K. R. Gopalakrishnana, “Engineering Drawing” (Vol. I & II), Subhas Publications, 1998.

11USM301 ENGINEERING MATHEMATICS III

(Common to ECE, EEE, CSE & IT)

L	T	P	C
3	1	0	4

Course Objectives

To provide strong foundation to the students to expose various emerging new areas of applied mathematics and appraise them with their relevance in Engineering and Technological field.

PRE-REQUISITE:

Limit concepts, Integration, Periodic function, Basic terminologies of odd and even functions

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Capable of mathematically formulating certain practical problems in terms of partial differential equations solve them and physically interpret the results.

CO2: Gain the well founded knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.

CO3: Obtain capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results.

CO4: Grasp the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair, and specialization on Fourier transform pair, their properties, the possible special cases with attention to their applications.

CO5: Learn the basics of Z-Transform in its applicability to discretely varying functions, gain the skill to formulate certain problems in terms of difference equations and solve them using the Z-Transform technique bringing out the elegance of the procedure involved.

UNIT- I FOURIER SERIES (9)

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT- II FOURIER TRANSFORMS (9)

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem– Parseval's identity.

UNIT- III PARTIAL DIFFERENTIAL EQUATIONS (9)

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients-Classification of PDE-Method of separation of variables.

UNIT- IV Z -TRANSFORMS AND DIFFERENCE EQUATIONS (9)

Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z- transforms.

UNIT- V LAPLACE TRANSFORMS (9)

Laplace transforms – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definition of Inverse Laplace transforms as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution

of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL HOURS: 45 + 15=60

TEXT BOOKS:

1. Grewal, B.S, 'Higher Engineering Mathematics' 40th Edition, Khanna publishers, Delhi, (2007)
2. Erwin Kreyszig 'Advanced Engineering Mathematics' , Eighth edition - Wiley India (2007).

REFERENCES:

1. Ramana.B.V. 'Higher Engineering Mathematics' Tata Mc-Graw Hill Publishing Company limited, New Delhi (2007).
2. Glyn James, 'Advanced Modern Engineering Mathematics', Third edition- Pearson Education (2007).
3. Bali.N.P and Manish Goyal 'A Textbook of Engineering Mathematics', Seventh Edition, Laxmi Publications (P) Ltd. (2007)

11UBK301 SOLID STATE CIRCUITS-I

L	T	P	C
3	1	0	4

Course Objectives

- *To introduce the methods of biasing transistors.*
- *To Design of simple amplifier circuits and power supplies..*
- *To know Advantages and method of analysis of feedback*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Design and Analyze BJT and FET amplifier circuits using various biasing methods.
CO2: Analyze the Transistors (BJT, FET) amplifier circuits using h-parameter model at low frequency.
CO3: Analyze the Transistors (BJT, FET) amplifier circuits using hybrid G model at high frequency.
CO4: Compute the power of various power amplifiers and differentiate the various power amplifiers.
CO5: Analyze and compute the performance parameters of power supply and rectifiers

UNIT-I BJT BIASING & FET BIASING (9)

BJT-Biasing-DC Load line, AC load line - Operating point-Fixed bias–Self Bias-Voltage Divider bias. Design of Bias circuit with emitter resistor - Bias stabilization - FET Biasing - Fixed Bias, Self Bias -Voltage Divider Bias - MOSFET Biasing – Thermal runaway & Stability.

UNIT-II AMPLIFIERS (9)

BJT Transistors Modeling-Hybrid equivalent circuit-Small signal analysis CE, CB, CC amplifiers-FET small signal analysis–Common Source & Drain-Frequency response of amplifiers-Compound Configurations-Cascade Connection-Darlington Connection - Differential Amplifier Analysis-Tuned Amplifiers-Types and Frequency response (principle only).

UNIT-III FREQUENCY RESPONSE OF AMPLIFIERS (9)

Cut off frequency and bandwidth - Low frequency analysis of amplifiers - Hybrid - pi equivalent circuit of BJT - High frequency analysis of BJT amplifiers - High frequency equivalent circuit of FET - Frequency analysis of FET amplifier - Gain-bandwidth product of FET - Frequency response of multistage amplifiers - Upper and lower cut off frequencies - Rise time and sag time.

UNIT-IV LARGE SIGNAL AMPLIFIERS (9)

Classification of amplifiers (Class A, B, AB, C&D) - Efficiency of class A, RC coupled and transformer - Coupled power amplifiers - Class B complementary-symmetry, Push-pull power amplifiers - Calculation of power output, efficiency and power dissipation - Crossover distortion.

UNIT-V RECTIFIERS AND POWER SUPPLIES (9)

Half-wave, full-wave and bridge rectifiers with resistive load - Analysis of C, CL, L-C and C-L-C filters with DC Voltage and ripple voltage-Voltage multipliers- Zener diode regulator-Line regulation - Output resistance and temperature coefficient - Switched mode power supplies-Power control using SCR.

TOTAL HOURS=45+15=60

TEXT BOOKS

1. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, Tata McGraw-Hill 200(9).
2. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 9th Edition, Pearson Education / PHI, 2010.

REFERENCES

1. Floyd, “Electronic Devices”, Pearson Education, Sixth edition, 2003.
2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, “Electronic Devices and Circuits”, 2nd Edition, Tata McGraw Hill, 2007.
3. David A. Bell, “Electronic Devices & Circuits”, 4th Edition, Prentice-Hall India, 2007.

11UBK302 **DIGITAL ELECTRONICS**

L	T	P	C
3	1	0	4

Course Objectives

- *To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions*
- *To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits*
- *To introduce the concept of memories and programmable logic devices.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Define the concepts of number systems; explain basic postulates of Boolean algebra and Boolean expression minimization techniques.
CO2: Design and apply logic gates for combinational logic circuits.
CO3: Analyze and design of sequential logic circuits.
CO4: Design and illustrate the concept of Asynchronous sequential circuit and hazards in digital circuits.
CO5: Classify the memory and design programmable logic devices.

UNIT-I MINIMIZATION TECHNIQUES AND LOGIC GATES (9)

Minimization techniques: Number systems,Addition and Subtraction-Subtraction using complements-Types of codes-Boolean postulates and laws, demorgan's theorem-Principle od duality-Boolean expression-Minimization of Boolean expressions-Minterm-Maxterm, SOP, POS, Karnaugh map minimization,Don't care conditions- Quine-McCluskey method of minimization.

Logic gates: AND,OR,NOT,NAND,NOR,Exclusive-OR and Exclusive-NOR- Implementation of logic function using gates, NAND-NOR implementations-Multilevel gate implementations-Multilevel output gate implementations, TTL and CMOS logic and their characteristics-Tristate gates.

UNIT-II COMBINATIONAL AND SEQUENTIAL CIRCUITS (9)

Design procedure- Half Adder- Full Adder, Half subtractor - Full subtractor,Parallel binary adder, Parallel binary subtractor,Fast adder-Carry look ahead adder,Serial adder/subtractor- BCD adder, Multiplexer/demultiplexer, Encoder, decoder,Parity checker-Parity generators-Code Converters- magnitude comparator

UNIT-III SEQUENTIAL CIRCUITS (9)

Latches, Flip-flops - SR, JK, D, T, and Master-Slave –Types of triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous counter and Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters- Modulo–n counter, Registers – shift registers - Universal shift registers-Shift register counters – Ring counter – Shift counters - Sequence generators.

UNIT-IV MEMORY DEVICES (9)

Classification of memories–ROM-ROM organization-PROM–EPROM – EEPROM – EAPROM, RAM–RAM organization–Write operation–Read operation–Memory Cycle-Timing wave forms –Memory decoding–memory expansion–Static RAM Cell-Bipolar RAM cell–MOSFET RAM cell–Dynamic RAM cell–Programmable Logic Devices–Programmable Logic Array (PLA)-Programmable Array Logic (PAL)–Field Programmable Gate Arrays (FPGA)-Implementation of combinational logic circuits using ROM, PLA, PAL

UNIT-V SYNCHRONOUS AND AYNCHRONOUS SEQUENTIAL CIRCUITS (9)

Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits –Design of Hazard Free Switching circuits. Design of Combinational and Sequential circuits using VERILOG.

TOTAL HOURS: 45+15=60

TEXT BOOKS

1. M. Morris Mano," Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2009 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2009.
3. Charles H.Roth." Fundamentals of Logic Design", 5th Edition, Cengage Learning, 2004

REFERENCES

1. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2006
2. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2003.
3. William H. Gothmann, "Digital Electronics", 2nd Edition, PHI, 1982.
4. Thomas L. Floyd," Digital Fundamentals", 8th Edition, Pearson Education Inc, NewDelhi, 2003

11UBK303 (R) NETWORK ANALYSIS AND SYNTHESIS

L	T	P	C
3	0	0	3

Course Objectives

- *To introduce basics about the Network analysis ns*
- *To introduce various network parameters*
- *To outline the formal procedures for the synthesis of network*
- *To introduce about equalizers, filters and attenuators.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Introduction to ports and network function analysis.
CO 2: Study of poles and zeros concept and its role in finding the stability.
CO 3: Analysis of various network parameters and their properties.
CO 4: Design of network elements like filters, attenuators and equalizers.
CO 5: Analyze various synthesis techniques using foster & cauer methods.

UNIT – I NETWORK ANALYSIS (9)

Terminal ports–Network functions for one port and two port-Ladder network–General networks – Poles and zeros of network functions-Restrictions on pole and zero Locations for driving point functions and transfer functions–Time domain behavior from the poles and zero plot–Stability of active networks

UNIT – II TWO PORT PARAMETERS (9)

Relationship of two port variables – Open circuit impedance parameters, short circuit admittance parameters – Transmission (ABCD) parameters – Hybrid (h) parameters – Inverse hybrid (g) and transmission parameters.

UNIT – III TWO PORT PARAMETERS RELATIONSHIP (9)

Relationships between parameters sets parallel connection of two port networks – T and TT representation – Lattice networks – Image parameters

UNIT – IV NETWORK SYNTHESIS (9)

Hurwitz polynomials – Positive real functions- Synthesis of reactive one port by Foster and Cauer method – Synthesis of RL & RC, and LC networks by Foster and Cauer methods.

UNIT – V FILTERS, ATTENUATORS & EQUALIZERS (9)

Filters: Filter network equations, constant k and constant m low pass and high pass filters– Band pass and band reject filters

Attenuators: T–type Attenuator–π Type Attenuator-Lattice Attenuator–Bridged-T attenuator **Equalizers-**Inverse Networks–Series Equalizer–Full Series Equalizer-Shunt Equalizer–Full Shunt Equalizer.

TOTAL HOURS: 45

TEXT BOOKS:

1. M.E. Van Valken Burg, "Network Analysis", PHI Third Edition, 1989.
2. M.E.Van Valken Burg, "Network Synthesis", PHI ,1989.
2.D.Roy choudary "Networks and systems ",Newage International,2 nd edtion,2011

REFERENCES:

1. Umesh Sinha, "Network Analysis and Synthesis", Satya Prakashan, 1997.
2. Sudhakar A and Shyammohan SP, "Circuits and Networks – Analysis and Synthesis", Tata McGraw Hill, 2001.
3. Frankelin Kuo, " Network analysis & Synthesis", McGrawHill, 1990
4. Ram Gayakwad, "Op-Amps and Linear Integrated Circuits", Prentice Hall, 4th Edition, 1999

11UDK351 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING

Course Objectives

- *To learn the systematic way of solving problems*
- *To learn to program in C++ and to efficiently implement the different data structures*
- *To efficiently implement solutions for specific problems*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Apply the basic concepts of C, Abstract Data type (ADT) & Recursion in developing programs.

CO 2: Apply the concept of stack, Queue, linked list, circular list and doubly linked list in various applications.

CO 3: Apply the concept of Tree, Binary Tree and their applications in practical applications.

CO 4: Apply the techniques of Internal sorting and various searching techniques in various applications.

CO 5: Identify, model and develop code for real life problems using shortest path and minimum spanning tree algorithm.

UNIT – I BASIC STRUCTURE OF C++ (9)

Differences between OOP and Procedure Oriented Programming – C++ Basics: Structure of a C++ program– Data types–Declaration of variables– C++ Classes And Data Abstraction: Class definition– Class objects– Class scope– this pointer– Friends to a class – Static class members – Constructors and Destructors – Polymorphism: Function overloading – Operator overloading.

UNIT –II FEATURES OF C++ (9)

Inheritance–Extending classes–Pointers–Virtual Base Class–Virtual functions and polymorphism – File Handling Templates– Exception handling – Manipulating strings

UNIT– III LINEAR DATA STRUCTURES AND HASHING (9)

Abstract Data Type (ADT)–The List ADT–Stack ADT–Queue ADT-Hashing – General Idea–Hash Function–Separate Chaining, Open Addressing–Linear Probing–Priority Queues (Heaps)

UNIT–IV TREES AND GRAPHS (9)

Preliminaries–Binary Trees–Search Tree ADT–Binary Search Trees–AVL Trees–Tree Traversal – Topological Sort–Shortest-Path Algorithms- Minimum Spanning Tree–Applications of Depth-First Search–Undirected Graphs– Bi-Connectivity

UNIT – V ALGORITHM DESIGN TECHNIQUES (9)

Introduction to algorithm design techniques: Greedy algorithms, Divide and conquer,Dynamic programming, backtracking, branch and bound, Randomized algorithms –Introduction to algorithm analysis: asymptotic notations, recurrences – Introduction to NP-complete problems

TOTAL HOURS: 45

TEXT BOOKS

1. C++: A Beginner's Guide, Second Edition, Herbert Schildt, TMH, 2010
2. C++: The Complete Reference, Herbert Schildt, 4th Edition, TMH, 2003
3. M. A. Weiss,"Data Structures and Algorithm Analysis in C", 3rded, Pearson Education,Asia,2009.

REFERENCES

1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2004.

2.Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", ThomsonBrooks / COLE, 1998.

3. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson education Asia, 1983.

11UBK304(R) ELECTROMAGNETIC FIELDS

L	T	P	C
3	1	0	4

Course Objectives

- To analyze fields a potentials due to static changes
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields, the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Apply and analyze the concept of electric field & potential due to static charges.

CO 2: Apply and analyze the concept of static magnetic fields.

CO 3: Describe the behaviour of electric & magnetic fields in passive elements.

CO 4: Analyze the fields under time varying conditions.

CO 5: Analyze and compute the propagation wave parameters in electromagnetic fields.

CO 6: understand different types of guided waves and various its characteristic.

UNIT I STATIC ELECTRIC FIELDS (9)

Introduction to Co-ordinate System – Rectangular – Cylindrical and Spherical Co-ordinate System – Introduction to line, Surface and Volume Integrals – Definition of Curl, Divergence and Gradient – Meaning of Strokes theorem and Divergence theorem.

Coulomb's Law in Vector Form – Definition of Electric Field Intensity – Principle of Superposition – Electric Field due to discrete charges – Electric field due to continuous charge distribution - Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field due to an infinite uniformly charged sheet.

UNIT II ELECTRIC POTENTIAL AND ELECTRIC FIELDS IN MATERIALS (9)

Electric Scalar Potential – Relationship between potential and electric field - Potential due to infinite uniformly charged line – Potential due to electrical dipole - Electric Flux Density – Gauss Law – Proof of Gauss Law – Applications.

Poisson's and Laplace's equation – Electric Polarization-Nature of dielectric materials-Definition of Capacitance – Capacitance of various geometries using Laplace's equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law – continuity equation for current.

UNIT III STATIC MAGNETIC FIELD MAGNETIC FIELDS IN MATERIALS (9)

The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications.

Magnetic flux density – The Lorentz force equation for a moving charge and applications – Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I – Magnetic moment – Magnetic Vector Potential.

Definition of Inductance – Inductance of loops and solenoids - Energy density in magnetic fields – Nature of magnetic materials – magnetization and permeability - magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS (9)

Faraday's law – Maxwell's Second Equation in integral form from Faraday's Law – Equation expressed in point form.

Displacement current – Ampere's circuital law in integral form – Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form. Maxwell's four equations in integral form and differential form.

Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

UNIT V ELECTROMAGNETIC WAVES (9)

Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material.

Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect.

Linear, Elliptical and circular polarization – Reflection of Plane Wave from a conductor – normal incidence – Reflection of Plane Waves by a perfect dielectric – normal and oblique incidence. Dependence on Polarization. Brewster angle.

TOTAL HOURS: 45+15=60

TEXTBOOKS

1. William H. Hayt and J.A. Buck "Engineering Electromagnetics" TATA McGraw-Hill 7th edition 2007
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 4th edition 2006.

REFERENCES

1. Narayana Rao, N : "Elements of Engineering Electromagnetics" 6th edition, Pearson Education, New Delhi,.2006.
2. Matthew.N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, 4th edition, 2007.
3. David K.Cheng: "Field and Wave Electromagnetics - Second Edition-Pearson Education, 2006.
4. Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons (3rd edition 2003)

11UBK304 DIGITAL ELECTRONICS LAB

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Construct and verify the Boolean functions using logic gates.

CO 2: Design and Construct the combinational logic circuits using logic gates.

CO 3: Design and Construct the sequential circuits using flip-flops

1. Study of Logic gates
2. Design and implementation of Adder and Subtractor using logic gates.
3. Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code and vice versa
   (ii) Binary to gray and vice-versa
4. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder uing IC 7483
5. Design and implementation of 2-bit Magnitude Comparator using logic gates and 8 Bit Magnitude Comparator using IC 7485
6. Design and implementation of 16-bit odd/even parity checker generator using logic gates and study of IC74180.
7. Design and implementation of Multiplexer and De-Multiplexer using logic gates and study of IC74150 and IC 74154
8. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147

(9). Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple Counters

10. Design and implementation of 3-bit synchronous up/down counter
11. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops
12. Design of experiments 1,2, 7, 8 and 11 using Verilog Hardware Description Language

TOTAL HOURS: 30

11UBK305 SOLID STATE CIRCUITS LAB- I

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Construct the rectifier circuit and determine the performance metrics and sketch the voltage regulators characteristics.

CO 2: Sketch the frequency response of BJT, FET amplifier circuits with various biasing methods and determine the experimental bandwidth.

CO 3: Compute the efficiency of power amplifiers.

CO4: Construct the Darlington Emitter follower circuit and determine the bandwidth.

1. Fixed Bias amplifier circuit using BJT (without bias, Determination of bias resistance, gain, frequency response & Gain Bandwidth Product)
2. Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias) with and without bypassed emitter resistor.
3. Design and construct BJT Common Collector Amplifier using voltage divider bias (self-bias).
4. Darlington Amplifier using BJT.
5. Source follower with Bootstrapped gate resistance.(gain, input resistance and output resistance with and without Bootstrapping, Comparison with calculated values.)
6. Differential amplifier using BJT.(Measurement of CMRR)
7. Class A Power Amplifier (Measurement of maximum power output, efficiency)
8. Class B Complementary symmetry power amplifier
9. Power Supply circuit - Half wave rectifier with simple capacitor filter.
10. Characteristics of SCR and UJT
11. Power Supply circuit - Full wave rectifier with simple capacitor filter

TOTAL HOURS: 30

11UDK353 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LAB

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Compute recursion in C to analyze the consumption of resources.

CO 2: Apply stack, queue & different linked list data structure to manage the memory using static and dynamic representation.

CO 3: Develop and analyze the efficiency of searching and sorting techniques.

CO 4: Construct the graph and its traversal methods for various applications.

CO 5: Identify appropriate data structure and apply it to solve a given problem.

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication)
2. Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc.
3. Implement Matrix class with dynamic memory allocation and necessary methods.
4. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.
5. Overload the new and delete operators to provide custom dynamic allocation of memory.
6. Array implementation of List Abstract Data Type (ADT)
7. Linked list implementation of List ADT
8. Stack ADT - Array and linked list implementations
9. Queue ADT – Array and linked list implementations
10. Search Tree ADT - Binary Search Tree
11. Heap Sort
12. Quick Sort

TOTAL HOURS: 30

11USM405 PROBABILITY AND RANDOM PROCESS

L	T	P	C
3	1	0	4

Course Objectives

To provide strong foundation to the students to expose various emerging new areas of applied mathematics and appraise them with their relevance in Engineering and Technological field.

PREREQUISITE

(i) Probability Theory–Random Experiment ,Mathematical Definition of Probability, Axioms of Probability, Conditional Probability, Independent Events, Theorem of Total Probability
(ii) Evaluation of Double Integrals .

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Gain the fundamental knowledge of the basic probability concepts and Random Variables.
CO2: Gain the well-founded knowledge of standard distributions which can describe real life phenomena.
CO3: Acquire skills in handling situations involving more than one random variable and functions of random variables.
CO4: Acquire knowledge in random process, Ergodic process and Markov chain.
CO5: Acquire knowledge in spectral density, linear time invariant system transfer function..

UNIT-I RANDOM VARIABLES (9)

Discrete and Continuous random variables – Moments - Moment generating functions and their properties. Standard Distributions : Binomial, Poisson , Geometric, Uniform, Exponential, Gamma , Weibull and Normal distributions – Function of Random Variable.

UNIT-II TWO DIMENSIONAL RANDOM VARIBLES (9)

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression – Multiple Regression - Transformation of random variables.

UNIT-III CLASSIFICATION OF RANDOM PROCESSES (9)

Definition and examples-first order, second order, strictly stationary, wide-sense Stationary processes-Markov process: Markov chain–transition probability matrix- steady state distribution –classification of states of a Markov chain–Poisson process–Sine wave process-Random Walk.

UNIT-IV CORRELATION AND SPECTRAL DENSITIES (9)

Auto correlation-Cross correlation-Properties–Power spectral density–Cross spectral density-Properties–Wiener-Khintchine relation–Relationship between cross power spectrum and cross correlation function

UNIT-V LINEAR SYSTEMS WITH RANDOM INPUTS (9)

Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

TOTAL HOURS: 45 + 15=60

TEXT BOOKS

1. Miller,S.L and Childers, S.L, "Probability and Random Processes with applications to Signal Processing and Communications", Elsevier Inc., First Indian Reprint 2007.
2. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002. (For units 3, 4 and 5).

REFERENCES

1. H. Stark and J.W. Woods, “Probability and Random Processes with Applications to Signal Processing”, Pearson Education (Asia), 3rd Edition, 2002.
2. Leon-Garcia,A, “Probability and Random Processes for Electrical Engineering”, Pearson Education Asia, Second Edition, 2007.
3. Yates and D.J. Goodman, “Probability and Stochastic Processes”, John Wiley and Sons, Second edition, 2005.

11UBK401 SOLID STATE CIRCUITS II

L	T	P	C
3	1	0	4

Course Objectives

On completion of this course the student will understand

- *The advantages and method of analysis of feed back amplifiers.*
- *Analysis and design of RC and LC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time based generators.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Identify and analyze the various types of feedback amplifiers.

CO2: Design and deduce the frequency of oscillation of different types of oscillators.

CO3: Analyze the various tuned amplifiers and distinguish stabilization Techniques

CO4: Design the Multivibrators and Schmitt trigger circuit and determine the output parameters.

CO5: Illustrate the construction and working principles of blocking oscillator and time based generators.

UNIT-I FEEDBACK AMPLIFIERS (9)

Classification of amplifiers-Block diagram. The four basic feedback topologies and the type of gain stabilized by each type of feedback. Input and Output resistances with feedback. Method of identifying feedback topology, feedback factor and basic amplifier configuration with loading effect of feedback network taken into account. Analysis of feedback amplifiers. Nyquist criterion for stability of feedback amplifiers.

UNIT-II OSCILLATORS (9)

Phase shift Oscillator,Resonant Circuit Oscillator.Ageneral form of Oscillator circuit,The Wien bridge Oscillator.analysis of LC oscillators.Crystal Oscillators-Frequency Stability. Quartz Crystal Construction. Electrical equivalent circuit of Crystal. Crystal Oscillator circuits.

UNIT-III TUNED AMPLIFIERS (9)

Coil losses, unloaded and loaded Q of tank circuits. Analysis of single tuned and synchronously tuned amplifiers.Double tuned amplifier. Instability of tuned amplifiers. Stabilization techniques. Narrow band neutralization using coil. Broad banding using Hazeltine neutralization. Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier.

UNIT-IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS (9)

RL & RC Integrator and Differentiator circuits. Diode clippers, clampers and slicers. Collector coupled and Emitter coupled Astable multivibrator. Monostable multivibrator. Bistable multivibrators. Triggering methods. Storage delay and calculation of switching times. Speed up capacitors. Schmitt trigger circuit.

UNIT-V BLOCKING OSCILLATORS AND TIMEBASE GENERATORS (9)

Monostable and Astable Blocking Oscillators using Emitter and base timing. Frequency control using core saturation. Pushpull operation of Astable blocking oscillator i.e., inverters. Pulse transformers. UJT sawtooth generators. Linearization using constant current circuit. Bootstrap and Miller saw-tooth generators. Current time base generators.

TOTAL HOURS:45+15= 60

TEXT BOOKS

1. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, Tata McGraw-Hill 2009.
2. Donald Schilling,Charles Belove,Tuvia Apelewicz, Raymond Saccardi, "Electronic Circuits: Electronic Circuits: Discrete And Integrated ", 3rd Edition, Tata McGraw-Hill, 2002

REFERENCES

1. Sedra and Smith, "Micro Electronic Circuits", 5th Edition, Oxford University Press, 2004.
2. David A. Bell, “Solid State Pulse Circuits ", 4th Edition, Oxford University Press, 2007.
3. Jacob Millman,Herbert Taub, "Pulse Digital and Switching waveform", 3rd Edition, Tata McGraw-Hill, 2011.
4. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”,9th Edition, Pearson Education / PHI, 2010.

11UBK402 ANALOG COMMUNICATION

L	T	P	C
3	0	0	3

Course Objectives

- *To learn the principles and operation of various Analog modulation and demodulation systems.*
- *To analyze the performance of analog receivers in the presence of noise*
- *To learn the concepts of sampling and pulse modulation systems.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe the Amplitude modulation and demodulation techniques.

CO 2: Describe the Angle modulation and demodulation techniques.

CO 3: Explain the different types of radio transmitters , receivers and its parameters.

CO 4: Analyze the noise performance in analog communication system .

UNIT-I MODULATION TECHNIQUES (9)

Frequency bands for communication, types of communication and need for modulation. Introduction to AM, FM, PM, Frequency spectrum of AM Waves, Representations of AM, Modulation index, Power relation in AM waves, SSB, VSB, Mathematical representation of FM, MI, frequency spectrum of the FM waves, Phase modulation, FM–PM relation, comparison between analog and digital modulation, Wide band and narrow band FM

UNIT-II AM TRANSMITTERS AND RECEIVERS (9)

AM TRANSMITTERS: AM modulators, low level and high level, AM transmitter block diagram, collector class C modulator, Base modulator DSB SC modulator. Generation of SSB

AM RECEIVER: Tuned radio frequency (TRF) receiver, Superheterodyne receiver, Detection and automatic gain control (AGC), AM receiver characteristics. Demodulation of SSB, Detection with diode balanced modulator, Pilot carrier receiver, suppressed carrier receiver.

UNIT-III FM TRANSMITTERS AND RECEIVERS (9)

FM TRANSMITTERS: Basic requirements and generation of FM, FM Modulation methods, Direct and indirect method, Pre-emphasis, AFC in reactance modulators, disadvantages of direct method, FM RECEIVERS: Limiters, single and double tuned demodulator, balanced slope detector, Foster Seeley or phase discriminator, de-emphasis, ratio detector, block diagram of FM receiver, characteristics.

UNIT-IV NOISE IN ANALOG SYSTEMS (9)

Introduction, Narrowband noise - representation of narrow band noise in terms of inphase and quadrature components - representation of narrow band noise in terms of envelope and phase components - Noise in CW modulation systems: Noise in linear receivers using coherent detection - Noise in linear receivers using envelope detection - Noise in FM receivers**.**

UNIT-V PULSE MODULATION (9)

Sampling theorem–Natural and Flat-top sampling–Generation and detection of pulse amplitude modulation, Pulse width modulation and Pulse Position Modulation–Time Division Multiplexing

TOTAL HOURS: 45

TEXT BOOKS

1. George Kennedy and Bernard Davis," Electronic Communication systems", TMH, 4th Edition, 2007
2. Simon Haykins,"Communication Systems", John Wiley and sons, 4th Edition,2001

REFERENCES

1. Wayne Tomasi, “Electronic Communications Systems – Fundamentals Through advanced”, Pearson Education, 6th Edition, 2007.
2. Taub and Schilling, “Principles of communication systems”, TMH,1995
3. Bruce Carlson,” Communication Systems”, Mc Graw Hill, III Ed.,2005.

11UBK403(R) MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

Course objectives

- *To learn basic measurement concepts, relevance of digital instruments in measurements and Measurement techniques in optical domains*
- *To introduce Importance of signal generators and signal analysers in measurements, need for data acquisition systems*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Describe the fundamental concepts of electronic measurements and indicating Instruments.
CO2: Explain the functional blocks of function generator and Analyzers.
CO3: Categorize the different types of transducers.
CO4: Describe the fundamentals of Modern measurement techniques.
CO5: Develop the knowledge on the Virtual Instrumentation concepts using Labview Software.

UNIT I TRANSDUCERS (9)

Measurements, static and dynamic characteristics, Errors in measurements, Calibration and standard, moving iron and moving coil meters, Classification and characteristics of Transducers, AC / DC Bridge measurement and their applications.

UNIT II SIGNAL GENERATOR AND SIGNAL ANALYZERS (9)

AF Generator, Pulse Generator, AM/FM Signal generator, Function generator, Sweep frequency generator, wave analyzers, Spectrum Analyzers, Logic Analyzers, Distortion Analyzers.

UNIT III DIGITAL INSTRUMENTS (9)

Digital Voltmeters and Multimeters, Automation in Voltmeters, Accuracy of DVM, Guarding Techniques, Automatic vector voltmeter. Digital, Electrical, Electronic Weighing System

UNIT IV DATA DISPLAY AND RECORDING SYSTEM (9)

CRO- frequency, period, time interval and pulse width measurements, single beam, dual trace, double beam CRO, Digital storage and Analog storage Oscilloscope, sampling Oscilloscope, Power scope, Curve Tracer, Analog, Digital Recorders.

UNIT V RECENT TRENDS IN MEASUREMENTS (9)

Intelligent instruments, Fiber optic sensors, Sensing systems, Fiber optic Gyroscope, Testing an Audio amplifier and Radio Receiver, Instrument used in Computer Controlled Instrumentation, Case studies in Virtual Instrumentation using LABVIEW software.

TOTAL HOURS=45

TEXT BOOKS:

1. Albert D. Helfrick and William D. Cooper, " Modern Electronic Instrumentation and Measurement Techniques ", Prentice Hall of India, 2003.
2. Rangan C.S., "Instrumentation Devices and Systems", Tata McGraw Hill, 1998.
3. Sanjay Gupta, "Virtual Instrumentation , Labview", Tata McGraw Hill, New Delhi,2003

REFERENCE BOOKS:

1. Bouwels A.J., " Digital Instrumentation ", McGraw Hill, 1986.
2. Barney C., " Intelligent Instrumentation ", Prentice Hall of India, 1985.
3. Oliver and Cage, " Electronic Measurements and Instrumentation ",McGraw Hill, 1975.
4. Ernest.O. Deobelin and Dhanesh N.Manik, " Measurement Systems application and Design ", McGraw Hill, 2007.
5. Patranabis.D,"Principles of Electronic Instrumentation", Prentice Learning Private Ltd, 2009

11UBK404(R) **SIGNALS AND SYSTEMS**

L	T	P	C
3	1	0	4

Course Objectives:

- To study and analyze the characteristics of continuous, discrete signals and systems.
- To study the properties and representation of discrete and continuous signals.
- To study the analysis and synthesis of continuous time systems.
- To study the analysis and synthesis of discrete time systems.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Classify signals based on their properties: in particular, to understand and exploit the implications of time shifting, amplitude scaling and represent periodic signals in Fourier Series form.

CO2: Determine Fourier Transform and Laplace Transform for continuous-time and be able to classify systems based on their properties and compute impulse response and transfer function.

CO3: Explain the sampling theorem and how it links continuous-time signals to discrete-time signals and compute Z-transform and inverse Z-transform.

CO4: Use the Z transforms to decompose the response of an LTI system and demonstrate discrete convolution and solve difference equations and compute Discrete Time Fourier Transform.

CO5: Analyze and design FIR and IIR LTI systems by interconnections using realization structures.

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS (9)

Continuous time signals (CT signals), Discrete time signals (DT signals)- Step, Ramp, Pulse, Impulse, Exponential, Transformation in independent variable of signals- time scaling, time shifting, time reversal, Classification of CT and DT signals, CT systems and DT systems, Classification of systems - Linear Time invariant systems.

UNIT II ANALYSIS OF CT SIGNALS (9)

Fourier series analysis, Spectrum of CT signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT III LTI - CT SYSTEMS (9)

Differential equation, Block diagram representation, Impulse response, Convolution integral, Frequency response, Fourier Methods and Laplace transforms in system analysis, State equations and Matrix.

UNIT IV ANALYSIS OF DT SIGNALS (9)

Discrete Time Fourier series analysis, Spectrum of DT signals, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT) and Z-transform in signal analysis.

UNIT V LTI - DT SYSTEMS (9)

Difference equations, Block diagram representation, Impulse response, Convolution SUM, Frequency response, DTFT and Z-transform in system analysis, State variable equation and Matrix.

TOTAL HOURS :45+15= 60

TEXT BOOK:

1. Allan V. Oppenheim et al, "Signals and Systems", Prentice Hall of India Pvt. Ltd, 1997.

REFERENCES

1. Ashok Ambardar, "Analog and Digital Signal Processing", Thomson Learning Inc., 1999.
2. Douglas K.Lindner, "Signals and Systems", McGraw-Hill International, 1999.
3. Simon Haykin and Barry Van Veen, "Signals and Systems", John Willey & Sons, Inc, 1999.
4. Roger E. Zeimer et al, "Signals and Systems", Continuous and Discrete, McMillan, 2 ED, 1990.

11UBK405 LINEAR INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

Course Objectives

- *To introduce the basic building blocks of linear integrated circuits and their applications.*
- *To introduce the theory and applications of analog multipliers and PLL, ADC and DAC*
- *To teach the theory of To introduce a few special function integrated circuits.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Explain the basic concepts of operational amplifiers.

CO 2: Design the various applications of operational amplifiers.

CO 3: Analyze the analog multiplier and Explain the concept of PLL with applications.

CO 4: Describe the concepts of data converter such as A-D and D-A.

CO 5: Describe the special function Integrated circuits such as 555 timer, LM7805.

UNIT-I OPERATIONAL AMPLIFIER (9)

Basics of Integrated Circuits-Advantages of IC's over discrete components- IC 741 Op-amp-Block diagram-Characteristics-Open and Closed loop configurations-Internal circuit diagram-Inverting and Non-inverting amplifier- -Current Mirror, Current sources, Voltage sources-Analysis of Difference amplifiers- DC and AC performance characteristics- Frequency compensation

UNIT-II DESIGN AND ANALYSIS OF OP-AMP APPLICATIONS (9)

Summer- Difference amplifier- Differentiator-Integrator- Log and Antilog amplifiers-Multiplier- Divider-Voltage to current converter- Instrumentation amplifier- Schmitt trigger-Precision rectifier- Comparator- Multivibrators- Sine wave Oscillators- Triangular wave generator- Active filters.

UNIT-III ANALOG MULTIPLIER AND PLL (9)

Analog multiplier using Emitter Coupled Transistor pair-Gilbert Multiplier cell-Variable transconductance multipliers -Analog Multiplier ICs- PLL -Voltage Controlled Oscillator Applications of PLL.

UNIT-IV ADC AND DAC (9)

Specifications of Converters- Types of D/A converter-Current driven DAC-DAC Switches - Types of A/D converter - Analog switches- High speed sample and hold circuits-Voltage to Time converters-Over sampling converters.

UNIT-V SPECIAL FUNCTION IC'S (9)

555 Timer-Design of Monostable and Astable operation- Series op-amp regulator- IC 723 voltage regulator- Monolithic switching regulator-SMPS-ICL8038 Function generator-Switched capacitor filter IC MF10-Frequency to Voltage converters-Audio Power amplifiers- Isolation Amplifiers- Video amplifier- Fiber optic ICs.

TOTAL HOURS: 45

TEXT BOOKS

1. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw Hill, 2002.
2. D.Roy Choudhry, Shail Jain, 'Linear Integrated Circuits', New Age International Pvt. Ltd., 2007.

REFERENCES

1. Gray and Meyer, ‘Analysis and Design of Analog Integrated Circuits’, Wiley International, 2005.
2. J.Michael Jacob, ‘Applications and Design with Analog Integrated Circuits’, PHI, 2002.
3. Ramakant A.Gayakwad, ‘OP-AMP and Linear IC’s’, Prentice Hall/ Pearson Education, 2005.
4. K.R.Botkar, ‘Integrated Circuits’. Khanna Publishers, 2005.
5. William D.Stanely, ‘Operational Amplifiers with Linear Integrated Circuits’. Pearson Education, 2004.

11UBK406 **COMMUNICATION LAB-I**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Construct and demonstrate the analog modulation & demodulation techniques.

CO 2: Construct and demonstrate the pre Emphasis & De Emphasis techniques.

CO 3: Construct and demonstrate the pulse modulation and multiplexing.

CO4 : Demonstrate and verify the analog and digital modulation and demodulation using Multisim Software.

1. Construct an amplitude modulation circuit using transistor :
    a) Measure the modulation indices (over, under, perfect)
    b) Generate the trapezoidal patterns (over, under, perfect)
    c) Recover the message using diode detector.
2. Construct Balanced modulator circuit using diodes and generate DSB-SC waveform
3. Construct Frequency modulation circuit and a demodulation circuit using PLL.
4. Construct Pre-emphasis and De-emphasis circuits and calculate gain.
5. Generate Sample and Hold waveform and measure the step size
6. Construct a circuit to generate PAM and verify sampling theorem.
7. Generation of PWM and PPM using IC 555.
8. Construct a circuit to generate Wideband Amplifier and calculate its Bandwidth
9. Design a Mixer circuit and measure the Intermediate frequency
10. Multiplex various signals using TDM
11. Simulation experiments:

    Using MultiSim:
    a) Amplitude modulation and demodulation system
    b) Balanced modulator for DSB-SC AM
    c) FM modulation and demodulation system

    Using MATLAB:
    d) AM modulation and demodulation system
    e) FM modulation and demodulation system

TOTAL HOURS: 30

11UBK407 **SOLD STATE CIRCUITS LAB-II**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Design audio and Radio frequency oscillator, multivibrator circuit and sketch the output waveforms.

CO2: Sketch the frequency response of feedback amplifier circuits with and without feedback and distinguish the bandwidth.

CO3: Design Schmitt trigger circuit and sketch the output waveform.

CO4: Design tuned amplifier circuit, determine the frequency response and sketch the output waveform.

CO5: Construct and test the electronic circuits using simulation software.

1. Series and Shunt feedback amplifiers (Frequency response, Input and output impedance calculation).
2. Design of RC Phase shift oscillator.
3. Design Wein Bridge Oscillator .
4. Design of Hartley Oscillator.
5. Design of Colpitts Oscilator.
6. Tuned Class C amplifiers.
7. Integrators, Differentiators, Clippers and Clampers.
8. Design of Astable and Monostable and Bistable multivibrators.

Simulation using Pspice:

1. Differential amplifier
2. Active filter : Butterworth IInd order LPF
3. Astable, Monostable and Bistable multivibrator - Transistor bias
4. D/A and A/D converter (Successive approximation)
5. Analog multiplier
6. Simulation of RC phase shift ,Wein bridge, Colpitt and Hartley Oscillator
7. Simulation of Series and Shunt feedback amplifiers

TOTAL HOURS: 30

11UBK408 LINEAR INTEGRATED CIRCUITS LAB

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Design, construct and verify linear & non-linear OP-AMP circuits.

CO 2: Design and construct multivibrators using IC741and IC555.

CO3: Design and construct DAC and ADC.

CO4: Design and construct filters using IC741.

CO 5: Design and construct oscillators using IC741.

Design and testing of:

1. Inverting, Non inverting amplifiers, Summer and Subtractor using Opamp IC 741.
2. Integrator and Differentiator using Opamp IC 741.
3. Logarithmic amplifier, Antilog Amplifier and Precision Rectifier
4. Astable, Monostable multivibrators and Schmitt Trigger using op-amp.
5. Instrumentation amplifier.
6. Second order active Lowpass, Highpass and Bandpass filters.
7. RC Phase shift and Wien bridge oscillator using op-amp.
8. Astable and monostable multivibrators using IC NE555 Timer.
9. Voltage Controlled Oscillator using IC 566.
10. PLL characteristics and Frequency Multiplier using IC 565.
11. A/D Converters & D/A Converters.
12. IC Voltage Regulator using LM317 and LM723.

TOTAL HOURS: 30

11UBK501 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	4

COURSE OBJECTIVES

At the end of this course, the students will be able to understand

- *Structures of Discrete time signals and systems*
- *Frequency response and design of FIR and IIR filter.*
- *Finite word length effect*
- *DSP Processor- TMS320C5X.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Compute the FFT of discrete time signals &analyze it.
CO2: Design and realize the finite impulse response digital filters.
CO3: Design and realize the infinite impulse response filters.
CO4: Illustrate the effect of finite word lengths in signal processing.
CO5: Describe the architectural features of digital signal processors.

UNIT I FAST FOURIER TRANSFORM (9)

Introduction to DFT- Efficient Computation of the DFT – Properties of DFT-Implementation of FFT Algorithms –Radix-2 FFT algorithms-Decimation in Time-Decimation in Frequency algorithms- Use of the FFT Algorithm in Linear Filtering and Correlation .

UNIT II DESIGN AND IMPLEMENTATION OF IIR FILTERS (9)

Design of analog filters - Butterworth and Chebyshev– IIR digital filter design from analog filter using impulse invariance technique and bilinear transformations Realization -Direct form I & II, Cascade and Parallel forms .

UNIT III DESIGN AND IMPLEMENTATION OF FIR FILTERS (9)

Linear phase response- design techniques for FIR filters- Fourier series method and frequency sampling method–Design of Linear phase FIR filters using windows: Rectangular, Hanning and Hamming windows- - Realization of FIR filters – Transversal, Linear phase structures

UNIT IV FINITE WORD LENGTH EFFECTS (9)

Fixed point and floating point number representations – Comparison – Quantization noise –Input quantization error–coefficient quantization error – Product quantization error – Zero-input limit cycle oscillations –overflow limit cycle oscillations – signal scaling.

UNIT V PROCESSOR FUNDAMENTALS (9)

Architecture and features: Features of DSP processors – multiplier-shifter-MAC unit-ALU-Fixed point Vs floating point DSP processor data paths – Memory architecture of a DSP processor (Von Neumann –Harvard) – Addressing modes – pipelining – TMS320 family of DSPs (architecture of C5x).

TOTAL HOURS=45+15=60

TEXT BOOKS

1. John .G. Proakis and Dimitris C. Manolakis , "Digital Signal Processing Principles, Algorithms and Applications , " Pearson Education, Third edition 2006.
2. Sanjit Mitra, "Digital Signal Processing "– A Computer based approach", Tata Mcgraw Hill, New Delhi, 2001

REFERENCE BOOKS

1. B.Venkataramani, M.Bhaskar, “Digital Signal Processors, Architecture, Programming and Application“, Tata McGraw Hill, New Delhi, 2003.
2. M.H.Hayes, “Digital Signal Processing”, Tata McGraw Hill, New Delhi, 2003.

11UBK502 **COMPUTER NETWORKS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- *To introduce the concept, terminologies, and technologies used in modern data communication and computer networking.*
- *To introduce the students the functions of different layers.*
- *To introduce IEEE standard employed in computer networking*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Describe the basic concepts, protocols and standards of data communications.

CO2: Illustrate the concept of error detection & corrections techniques in the flow control & error control mechanisms.

CO3: Describe the concept of different routing techniques and the compute the shortest path.

CO4: Explain the concepts of congestion control techniques and quality of service in transport layer.

CO5: Describe the concepts relating to web and network security.

UNIT I DATA COMMUNICATIONS (9)

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

UNIT II DATA LINK LAYER (9)

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control: stop and wait – go back N ARQ – selective repeat ARQ- sliding window techniques – HDLC.

LAN: Ethernet IEEE 802.3, IEEE 802.4, and IEEE 802.5 – IEEE 802.11–FDDI, SONET – Bridges.

UNIT III NETWORK LAYER (9)

Internetworks - Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER (9)

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATION LAYER (9)

Domain Name Space (DNS) – SMTP, FDP, HTTP, WWW – Security – Cryptography.

TOTAL HOURS=45

TEXT BOOKS

1. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, 2004.
2. William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000.

REFERENCES

1. James .F. Kurouse & W. Rouse, “Computer Networking: A Top down Approach Featuring”, Pearson Education, ,3/e, Pearson Education.
2. Larry L.Peterson & Peter S. Davie, “Computer Networks”, Harcourt Asia Pvt. Ltd., Second Edition.
3. Andrew S. Tannenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.

11UBK503 MICROPROCESSORS AND MICROCONTROLLERS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- *To study the architecture and Instruction set of 8085 and 8086*
- *To develop assembly language programs in 8085 and 8086.*
- *To design and understand multiprocessor configurations*
- *To study different peripheral devices and their interfacing to 8085/8086.*
- *To study the architecture and programming of 8051 microcontroller.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Explain the organization and internal architecture of 8-bit microprocessor-8085 and write the assembly language program using 8085 instruction set.
CO 2: Explain the organization and internal architecture of 16-bit microprocessor-8086, operating modes and memory segmentation of 8086.
CO 3: Demonstrate programming proficiency using the various addressing modes and instructions of 8086 microprocessor.
CO 4: Study of 8031 & 8051 Microcontrollers.
CO 5: Describe the concepts of memory and I/O interfacing, interfacing high power device and design memory and I/O interfacing circuits.

UNIT I 8085 MICROPROCESSOR (9)

Introduction to 8085–Microprocessor architecture– Instruction set–Addressing modes-Typical programming examples, delay routines, Instruction Timing and Execution, Programming I/O, Interrupt systems

UNIT II 8086 MICROPROCESSOR (9)

Intel 8086 microprocessor–Architecture– Instruction set and assembler directives- Addressing modes–Assembly language programming– Procedures– Macros– Interrupts and interrupt service routines.

UNIT III 8086 SYSTEM DESIGN (9)

8086 signals and timing – MIN/MAX mode of operation – Addressing memory and I/O – Multiprocessor configurations – System design using 8086

UNIT IV I/O INTERFACING (9)

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications.

UNIT V MICROCONTROLLERS (9)

Organisation of 8031 and 8051 microcontrollers – I/O ports – External memory – Counters and Timers – Serial data input and output – Interrupts – Instruction set – Addressing modes – Assembly Language programming – Simple Applications

TOTAL HOURS=45

TEXT BOOKS

1. Ramesh S.Gaonkar, “Microprocessor - Architecture, Programming and Applications with the 8085”, Penram International publishing private limited, fifth edition.
2. A.K. Ray & K.M.Bhurchandi, “Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing”, TMH, 2002 reprint

REFERENCES

1. Douglas V.Hall, “Microprocessors and Interfacing: Programming and Hardware”, TMH, Third edition,2006.
2. Yu-cheng Liu, Glenn A.Gibson, “Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design”, PHI, 2003
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, “The 8051 microcontroller and embedded systems”, Pearson education, 2004.

11UBK504 **DIGITAL COMMUNICATION**

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- *To study pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals*
- *To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Explain the fundamentals of Sampling, quantization, and Pulse modulation techniques.

CO2: Explain the baseband pulse transmission & ISI and derive power spectra of discrete PAM signals.

CO3: Describe Modulation and demodulation techniques and Deduce the signal space diagram, Probability of error and power spectra of different digital modulation schemes (BPSK,QPSK,BFSK,MSK).

CO4: Compute the various error control coding techniques.

CO5: Explain the direct sequence and frequency hop spread spectrum techniques and compute the PN sequence.

UNIT I SAMPLING AND WAVEFORM CODING (9)

Sampling Theorem- Band pass sampling- PAM- PCM- Uniform and Non-Uniform Quantization- Quantization error- DM and Adaptive Delta Modulation - DPCM- TDM Principles- Digital Hierarchy.

UNIT II BANDLIMITED SIGNALLING (9)

Power Spectra of PAM signals-Inter Symbol Interference- Ideal Nyquist channel- Raised Cosine Channels- Correlative Coding- Eye patterns- Adaptive Equalization for Data Transmission

UNIT III PASS BAND DATA TRANSMISSION (9)

Pass band Transmission Model- ML criterion-correlation receivers- Matched filters. Generation-Detection- Signal Space diagram- Bit error probability and power spectra of BPSK- QPSK- FSK and MSK schemes- Performance comparisons- carrier and bit synchronization

UNIT IV ERROR CONTROL CODING (9)

Linear block codes- Cyclic codes- Convolution Codes: Coding Gain and Viterbi decoding of Convolution Codes- Trellis coded modulation.

UNIT V SPREAD SPECTRUM SYSTEMS (9)

Pseudo Noise sequences- generation-principles of DSSS-correlation properties- m-sequence and Gold sequence- FH-SS- processing gain- anti-jam

TOTAL HOURS=45+15=60

TEXT BOOKS:

1. Simon Haykins "Digital Communications", John Wiley, 4/E, 2007.
2. H. Taub, D.L.Schilling, G. Saha, "Principles of Communication Systems", 3/E, Tata McGraw Hill Publishing Company, New Delhi, 2008

REFERENCES:

1. John.G.Proakis "Digital Communication"- McGraw Hill, 3/E , 2008.
2. K.N.Chari., D.Ganesh Rao,"Digital Communications", 2/E, Sanguine Technical Publishers, Bangalore, 2005
3. B.Sklar " Digital communications", 2/E Prentice Hall, 2001

11UBK505 (R) TRANSMISSION LINES & WAVE GUIDES

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- *To study basics of transmission line and discuss the parameter estimation*
- *To learn the characteristics of guided waves and wave propagation in waveguides*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Derive and compute the electrical parameters of Transmission lines at low frequencies.

CO 2: Compute and Design the transmission line parameters at radio frequency using smith chart.

CO 3: Explain the concepts of propagation of radio waves and possible existence of various wave modes in a guided medium.

CO 4: Explain the concepts of propagation of radio waves and modes in a rectangular waveguides.

CO 5: Explain the concepts of propagation of radio waves and modes in circular waveguides and resonators.

UNIT – I TRANSMISSION LINE PARAMETERS & THEORY (9)

Transmission line Parameters – Characteristic impedance–as a cascade of T-Sections - Definition of Propagation Constant - General Solution of the transmission line – The two standard forms for voltage and current of a line terminated by an impedance – physical significance of the equation and the infinite line – The two standard forms for the input impedance of a transmission line terminated by an impedance – meaning of reflection coefficient – wavelength and velocity of propagation. Waveform distortion – distortion less transmission line –Input impedance of loss less lines – reflection on a line not terminated by Zo - Transfer impedance – reflection factor and reflection loss – T and ∏ Section equivalent to lines.

UNIT – II THE LINE AT RADIO FREQUENCIES (9)

Parameter of the open wire at high frequencies-coaxial line-Standing waves and standing wave ratio on a line – One eighth wave line – The quarter wave line and impedance matching – the half wave line. The circle diagram for the dissipation less line – The Smith Chart – Application of the Smith Chart – Conversion from impedance to reflection coefficient and vice-versa. Impedance to Admittance conversion and vice versa – Input impedance of a loss less line terminated by an impedance – single stub matching and double stub matching.

UNIT – III GUIDED WAVES (9)

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation – component uniform plane waves between parallel planes – Attenuation of TE and TM waves in parallel plane guides – Wave impedances.

UNIT – IV RECTANGULAR WAVEGUIDES (9)

Transverse Magnetic Waves in Rectangular Wave guides–Transverse Electric Waves in Rectangular Waveguides–characteristic of TE and TM Waves–Cutoff wavelength and phase velocity–Impossibility of TEM waves in waveguides–Dominant mode in rectangular wave guide –Attenuation of TE and TM modes in rectangular waveguides–Wave impedances–characteristic impedance – Excitation of modes

UNIT – V CIRCULAR WAVE GUIDES AND RESONATORS (9)

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 wave guide – excitation of modes – Microwave cavities, Rectangular cavity resonators, circular cavity resonator, semicircular cavity resonator, Q factor of a cavity resonator for TE101 mode.

TOTAL HOURS=45+15=60

TEXT BOOKS:

1. J.D.Ryder “Networks, Lines and Fields”, PHI, New Delhi, 2003. E.C.
2. Jordan and K.G.Balmain “ElectroMagnetic Waves and Radiating System”, PHI, NewDelhi, 2003

REFERENCES:

1. B.Somanathan Nair, “Transmission Lines and Wave guides”, Sanguine Technical Publishers, 2006.
2. David M.Pozar, “Microwave Engineering” 2/e, John Wiley 2000.

11UBK506 MICROPROCESSOR &MICROCONTROLLERS LAB

L	T	P	C
0	0	3	2

COURSE OUTCOMES

CO1: Develop the Assembly Language Program for 8085, 8086, 8051 using instruction set and records the input output data.
CO2: Develop an assembly language programs for interfacing IC hardware 8251, 8255, DAC, ADC with 8085 microprocessor.
CO3: Develop an assembly Language Program for 8051 timer, serial communications and ports.

Upon successful completion of the course, students shall have ability to

1. Programs based on Arithmetic and Logic Instructions.
2. Programs based on Arrays – Largest Number, sorting of an Array.
3. Block transfer.
4. Code conversions
5. Programs involving subroutines
6. Programs with look up table
7. Average of N numbers
8. 8051 Timer
9. 8051 serial communication
10. 8051 port programming
11. Matrix keyboard & seven segment display interfacing
12. DAC Interface
13. ADC Interface
14. Stepper motor Interface

TOTAL HOURS=30

11UBK507 **DIGITAL SIGNAL PROCESSING LAB**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Demonstrate the sampling theorem and determine the stability of the given system.
CO2: Interpret the response of the LTI systems.
CO3: Design and Construct different types of FIR filter and sketch the frequency response characteristics.
CO4: Design and Construct different types of IIR filter and sketch the frequency response characteristics.
CO5: Develop the algorithms using TMS320C50 DSP processor.

USING TMS320C5X

1- Generation of Signals (saw tooth, triangle, sinusoidal, square wave)

2- Linear Convolution

3- Implementation of a FIR filter

4- Implementation of an IIR filter

5- Calculation of FFT

USING MATLAB

1- Generation of Discrete time Signals

2- Verification of Sampling Theorem

3- FFT and IFFT using DIT algorithms

4- Time & Frequency response of LTI systems

5- Linear and Circular Convolution through FFT

6- Design of FIR filters (using window)

7-Design of IIR filters (Butterworth & Chebychev)

TOTAL HOURS=30

11UBK508 **COMMUNICATION LAB - II**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Construct and demonstrate the digital modulation techniques.
CO 2: Construct and demonstrate the encoder, decoder & PCM.
CO 3: Performance & analysis of error control codes.
CO4 : Demonstrate and verify the digital modulation and demodulation using simulation Softwares.

1. PAM and verification of sampling theorem
2. Pulse Code Modulation Encoder and Decoder
3. Delta modulation and Adaptive Delta Modulation
4. Digital Modulation Techniques ASK, PSK, FSK (Hardware)
5. Error Control Coding using MATLAB.
6. Psuedo-random Sequence Generator
7. Design and performance analysis of error control encoder and decoder (CRC, Convolutional Codes
8. Simulation of Modulation and Coding in a AWGN Communication Channel using Simulation Package
9. Implementation of Linear and Cyclic Codes.
10. Simulation of various modulation schemes using MATLAB

TOTAL HOURS=30

11UBK601 WIRELESS COMMUNICATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- *It deals with the fundamental cellular radio concepts such as frequency reuse and handoff. This also demonstrates the principle of trunking efficiency and how trunking and interference issues between mobile and base stations combine to affect the overall capacity of cellular systems.*
- *It provides idea about analog and digital modulation techniques used in wireless communication. It deals with second generation and third generation wireless networks and worldwide wireless standards.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Description of fundamental cellular radio such as frequency reuse and handoff.

CO 2: demonstrate the principle of trunking efficiency and how trunking and interference issues between mobile and base stations combine to affect the overall capacity of cellular systems.

CO 3: Introduce to various generation wireless networks and its standards.

CO 4: Insight into the wireless networks.

UNIT I INTRODUCTION TO WIRELESS COMMUNICATION SYSTEMS (9)

Evolution of mobile radio communications, examples of wireless communication systems, paging systems, Cordless telephone systems, Cellular Telephone systems, comparison of various wireless systems.

UNIT II INTRODUCTION TO CELLULAR MOBILE SYSTEMS (9)

Spectrum Allocation, basic cellular systems, performance criteria, operation of cellular systems, analog cellular systems and digital cellular systems. Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, micro cell concept.

UNIT III MODERN WIRELESS COMMUNICATION SYSTEMS (9)

Introduction to Second generation, third generation and fourth generation wireless networks, wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks.

UNIT IV MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION (9)

Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems.

UNIT V WIRELESS NETWORKING (9)

Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks.

TOTAL HOURS=45

TEXT BOOKS:

1. Theodore S. Rappaport, "Wireless Communications: Principles & Practice", Second Edition, Prentice Hall, 2002.

2. W.C.Y.Lee ,"Mobile Cellular Telecommunication", McGraw Hill Book Company, 1990.

REFERENCES

1. Jochen Schiller," Mobile Communications", Addison Wesley, 2000.

11UBK602 **VLSI DESIGN**

L	T	P	C
3	1	0	4

COURSE OBJECTIVES

- *To introduce MOS theory / Manufacturing Technology*
- *To study inverter / counter logic / stick / machine diagram / sequential circuits.*
- *To study address / memory / arithmetic circuits.*
- *To introduce FPGA architecture / principles / system design.*
- *To get familiarized with VHDL programming behavioral/Structural/concurrent/process.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Describe the fundamentals of CMOS technology

CO2: Describe the operation and characteristics of MOSFET transistors and analyze the performance characteristics of CMOS inverter.

CO3: Classify, design, and describe the operation of CMOS logic circuit family.

CO4: Describe clocking styles. Explain the need for testing and its methods.

CO5: Construct the VHDL code for combinational and sequential circuits.

UNIT I OVERVIEW OF VLSI (9)

Complexity and Design – MOSFETs as switches – Basic Logic Gates in CMOS – Complex Logic Gates in CMOS –Transmission Gate circuits - CMOS Layers - Designing FET Arrays.

UNIT II MOS PHYSICS (9)

nFET Current-Voltage Equations – The FET RC Model – pFET Characteristics – DC characteristics of CMOS Inverter – Inverter Switching Characteristics – Power Dissipation – Transmission Gates and Pass Transistors.

UNIT III CMOS CIRCUITS (9)

Pseudo-NMOS – Tri-State Circuits – Clocked CMOS – Dynamic CMOS Logic circuits – Interconnect Delay Modelling - Crosstalk – Floorplaning and Routing – Input and Output circuits – Power distribution and consumption – Low Power Design Considerations

UNIT IV CLOCKING AND TESTING (9)

CMOS clocking styles – Pipelined systems – System Design Considerations – Reliability and Testing of VLSI circuits – General Concepts – CMOS testing – Test Generation Methods.

UNIT V VLSI SYSTEMS SPECIFICATIONS AND COMPONENTS USING VHDL (9)

Systems Specifications – Structural Gate Level Modeling – Switch Level Modeling – Design Hierarchy – Behavioral and RTL Modeling – Multiplexer –Binary Decoders – priority Encoders – Latches – Flip Flops and Registers – Arithmetic Circuits in CMOS VLSI: Adders and Multipliers

TOTAL HOURS=45+15=60

TEXT BOOKS

1. Neil H. E. Weste and Kamran Eshraghian, "Principles of CMOS VLSI Design" Addison Wesley, 1999
2 Keng, Lable Bick, “CMOS Digital Integrated Circuits”, Tata McGraw Hill,1999.

REFERENCES:

1. Smith, “Application Specific Integrated Circuits”, Addison Wesley, 1997.
2. Mukherjee, “Introduction NMOS and CMOS VLSI System Design”, PH 1986.
3. Kamran Eshraghian, Douglas A Pucknell and Sholeh Eshraghian “Essentials of VLSI Circuits and Systems”, Prentice Hall of India Pvt Ltd, 2006.
4. John P Uyemura, “ Chip Design for Submicron VLSI:CMOS layout and simulation” Thomson India Edition, 2006

11UBK603 ANTENNA AND WAVE PROPAGATION

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- *To study radiation from a current element.*
- *To study antenna arrays*
- *To study aperture antennas*
- *To learn special antennas such as frequency independent and broad band antennas.*
- *To study radio wave propagation.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

C01: Define radiation parameters and radiation properties of current element

CO2: Explain the concepts of the linear & wire loop antennas.

CO3: Design of different types of arrays.

CO4: Explain about special antennas and Measure Radiation pattern

CO5: Explain the different kinds of Radio wave propagation in space and their characteristics and compute critical frequency

UNIT I ANTENNA FUNDAMENTALS AND PARAMETERS (9)

Introduction -Types of antennas-Radiation mechanism –current distribution-Radiation pattern-power density-radiation intensity-directivity-gain-antenna efficiency beamwidth--bandwidth-polarization-radiation efficiency-effective aperture-Friss equation and radar range equation-antenna temperature-Far field radiation-duality theorem- concept of retarded vector potentials.

UNIT II LINEAR WIRE AND LOOP ANTENNAS (9)

Linear wire antenna- Infinitesimal dipole-small dipole-finite length dipole- Half wavelength dipole, Loop antenna- Circular loop antenna of constant current-ferrite loop.

UNIT III ARRAYS- PLANAR AND LINEAR (9)

Two-element array - N element linear array-uniform spacing and amplitude-broadside, end-fire, phased array-N element linear array directivity and characteristics-N element linear array-uniform spacing and non-uniform amplitude-planar array-circular array.

UNIT IV TRAVELING WAVE AND BROADBAND ANTENNAS (9)

Folded dipole, V antenna, Rhombic antenna, Helical antenna, Yagi-uda array of linear elements-Spiral antenna-Log periodic antenna. Concept of Horn antenna- Parabolic reflector, Antenna measurement- radiation pattern, far and near field measurement-Anechoic chamber.

UNIT V WAVE PROPAGATION (9)

Fundamental equation for free space propagation—modes of propagation structure of atmosphere and characteristics-sky wave propagation-effects of Earth's magnetic field-Application of Bartree magnetic ionic formula-Hartree formula-effective dielectric constant and conductivity of the ionosphere and collision frequency –lowest Usable frequency-Skip distance-Optimum working frequency-ionospheric Abnormalities – Multi hop propagations - space wave propagation –Duct propagation.

TOTAL HOURS=45+15=60

TEXT BOOKS

1. Constantine A,Balanis “Antenna Theory: Analysis and Design”, John Wiley Publishers, 2003.
2. K.D.Prasad “Antenna and Wave Propagation”, Satya prakashan, 1996.

REFERENCE BOOKS

1. John D.Kraus "Antennas”, Tata Mc Graw Hill, 2002
2. H.Griffiths, J.Encianas, A.Papiernik and Serge Drabowitch “Modern Antennas”, Chapman and Hall,1998

11UBK604 EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

At the end of the course, student will know about

- *Embedded hardware*
- *Software architecture*
- *Development tools and debugging techniques.*
- *Controller area network*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe the Embedded Systems architecture and its development tools

CO 2: Explain the programming concepts for Embedded Systems and its memory management.

CO 3: Describe the architecture of ARM processor and distributed embedded networks

CO 4: Analyze the Real time Operating System concepts.

CO 5: Development of Real time embedded systems and applications.

UNIT I INTRODUCTION (9)

Examples of Embedded Systems and Real-Time Embedded Systems – Basics of Developing Embedded Systems – The Linker – Executable and Linking Formats – Mapping Executable Images into Target Embedded Systems – Embedded System Initialization – On-chip Debugging

UNIT- II EMBEDDED PROGRAMMING – C & ASSEMBLY MEET (9)

Manipulating bits in memory and I/O ports-accessing memory mapped I/O devices – structures-variant access-mixing C to assembly-register usage-use of addressing options -- Instruction sequencing – Procedure call and return-parameter passing – retrieving parameters memory management-scope-automatic allocation - static allocation-dynamic allocation - shared memory

UNIT-III ARM & DISTRIBUTED EMBEDDED NETWORKS (9)

ARM processor- Processor and memory organization, Data operations, Flow of Control - Distributed Embedded Architecture - I2C, CAN Bus, SHARC link ports, Ethernet, Myrinet, Internet, Network-Based design - Hardware platform design, Allocation and scheduling

UNIT- IV REAL-TIME CHARACTERISTICS (9)

Clock driven Approach, weighted round robin Approach, Priority driven Approach, Dynamic Versus Static systems, effective release times and deadlines, Optimality of the Earliest deadline first (EDF) algorithm, challenges in validating timing constraints in priority driven systems, Off-line Versus On-line scheduling.

UNIT-V VALIDATION AND TESTING OF EMBEDDED SYSTEMS (9)

Program validation and testing, clear box testing, black box testing, evaluating function tests and performance testing. System design techniques: Design Methodologies, Requirements analysis, specifications, Quality assurance

TOTAL HOURS=45

TEXT BOOKS

1. Qing Li, “Real-Time Concepts for Embedded Systems”, Elsevier - CMP Books, 2003
2. Daniel W Lewis, “Fundamentals of Embedded Software” Pearson Education-2001

REFERENCE BOOKS:

1. Wayne Wolf, “Computers as Components: Principles of Embedded Computing System Design”, Morgan Kaufman Publishers, 2001.
2. Jane.W.S. Liu, “Real-Time systems”, Pearson Education Asia, 2000

11UFK621 **CONTROL SYSTEM**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- *To understand the open loop and closed loop (feedback) systems*
- *To understand time domain and frequency domain analysis of control systems required for stability analysis.*
- *To understand the compensation technique that can be used to stabilize control systems*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Employ the methods of representation of systems and get their transfer function models.

CO2: Illustrate the time response of systems and steady state error analysis.

CO3: Categorize the concepts of open loop and closed-loop frequency response of systems.

CO4: Determine the stability of control system using Root Hurwitz criterion, Nyquist stability criterion and Root Locus.

CO5: Illustrate the concepts of state variables for a control system.

UNIT I CONTROL SYSTEM MODELLING (9)

System concept, differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, Block diagram representation of systems – Block diagram reduction methods –signal flow graph.

UNIT II TIME DOMAIN ANALYSIS (9)

Test signals – time response of first order and second order systems – time domain specifications – types and order of systems – generalized error co-efficient – steady state errors, Introduction to P, PI and PID controllers.

UNIT III FREQUENCY DOMAIN ANALYSIS (9)

Introduction – correlation between time and frequency response – Frequency response- Bode plots, Polar plots, Nyquist plot – Gain margin – phase margin. Nichols chart, series, parallel and series parallel compensators

UNIT IV STABILITY ANALYSIS (9)

Concepts of stability – Routh-Hurwitz stability – Root locus technique, construction of root locus, stability, dominant poles, application of root locus diagram, Nyquist stability criteria

UNIT V STATE VARIABLE ANALYSIS (9)

State space representation of continuous time systems, state equations, transfer function from state variable representation, solutions of state equations, concepts of controllability and observability

TOTAL HOURS=45

TEXT BOOKS

1. Ogata.K, "Modern Control Engineering, Prentice Hall of India", 4th Edition, 2003
2. Nagrath & Gopal, "Control System Engineering", 3rd Edition, New Age International Edition, 2002.

REFERENCES

1. Benjamin.C.Kuo, "Automatic Control Systems", 7th Edition – Prentice Hall of India, 2002
2. M.Gopal, "Control Systems", Tata McGraw-Hill, 1999

11UBK605 **NETWORKING LAB**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Demonstrate parallel & serial communication for data transmission using hardware

CO2: Illustrate the concept of Stop-n-wait, Go back-N and selective repeat protocol using LAN-Trainer.

CO3: Develop the distance vector routing and link state routing algorithms.

CO4: Demonstrate the performance of CSMA/CA, CSMA/CD, token bus and token ring protocol and to determine the performance metric.

CO5: Exhibit the data encryption and decryption algorithm.

1. PC to PC Communication – Parallel and Serial.
2. Perform and simulate the experiment on CSMA, CSMA/CD and CSMA/CA Protocols with LAN Trainer Kit with Bus Topology and Star Topology and compare the results.
3. Study the performance of Token Bus and Token Ring Protocols using Simulation.
4. Write a Program to implement Connection Oriented Client Server communication (Socket Programming) using TCP Protocol
5. Write a Program to implement UDP oriented Client Server communication (Socket Programming)
6. Multicast & Broadcast Sockets
7. Implementation of Data Link Layer Flow Control Mechanism -Stop & Wait, Sliding Window Protocols.
8. Implementation of Data Link Layer Error Detection Mechanism -CRC
9. Implementation of Data Link Layer Error Control Mechanism -Selective Repeat, Go Back N Protocols
10. Implementation of Distance Vector and Link State Routing algorithms.
11. Basic Network simulation using the NS2 software.

TOTAL HOURS=30

11UBK606 **VLSI LAB**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Design and develop the combinational logic circuit using VHDL.

CO2: Design and develop the sequential logic circuit using VHDL.

CO3: Illustrate the operation of CMOS circuit using SPICE.

CO4: Design, implement and test the working real time systems using FPGA.

Design and simulation of Logic Circuits using HDL

Study of simulation and synthesis software

1. Design and simulation of half adder & full adder circuits
2. Design and simulation of half subtractor & full subtractor circuits
3. Design and simulation of flip flop(JK, D,T)
4. Design and simulation of 4*1 multiplexer and 1*4 demux
5. Design and simulation of 2*4 decoder & 4*2 encoder
6. Design and simulation of priority encoder (2 bit)
7. Design and simulation of shift registers(left and right shift)
8. Design and simulation of counters (2 bit counter)
9. Design and simulation of memory units
10. Design and simulation of sequential logic circuits represented by mealy model
11. Design and testing of 8 bit parity generators
12. Design and testing of 8-bit ALU
13. Design and simulation Frequency Divider

MINI PROJECTS:

Design of Traffic light control

Implementation of RTC

Implementation of serial adder

Place and route and back annotation for FPGA

CMOS Circuit design using SPICE

1. CMOS Inverter
2. CMOS NAND Gate
3. CMOS NOR Gate
4. CMOS D Latch
5. SRAM

TOTAL HOURS=30

11UFK629 MACHINES AND CONTROL SYSTEMS LAB

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Pre Determine the regulation of alternator by EMF & MMF methods.

CO2: Compute the load & speed of motors & transformers.

CO3: Study of transfunction of generators & motors.

CO4: Study of various controllers.

Machines Lab:

1. Load test on DC Shunt motor
2. Speed control of DC shunt motor
3. Load test on single phase Transformer.
4. Open circuit and short circuit test on single phase Transformer
5. Load test on three phase squirrel cage induction motor.
6. No load and blocked rotor test on three phase induction motor.
7. Predetermination of regulation of alternator by EMF and MMF method.
8. Study of Stepper motor

Control system Lab:

9. Transfer function of separately exited DC generator
10. Transfer function of armature and field controlled DC Motor.
11. Lead lag compensator
12. Study of P, PI, PID Controller
13. Stability analysis using MATLAB

TOTAL HOURS: 30

11UBK701 MICROWAVE ENGINEERING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- *To enable the student to become familiar with active and passive microwave devices and components used in Microwave communication systems.*
- *To study Microwave sources and amplifiers.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Define two port networks, and describe about the applications of microwave passive devices.
CO2: Describe the operation of various microwave tubes and analyze their performance.
CO3: Apply and Calculate the VSWR, Impedance, S-parameters and losses at microwave frequencies.
CO4: Analyze the operation and characteristics of various microwave semiconductor devices.
CO5: Illustrate the behavior of microwave strip line and its associated losses.

UNIT I MICROWAVE NETWORK CHARACTERIZATION AND PASSIVE COMPONENTS

(9) Circuit and S parameter representation of N ports- Reciprocity Theorem- Lossless networks and unitary conditions- ABCD parameters-Cascaded networks-Relations between S- Y and ABCD parameters- Effect of changing the reference planes in the S matrix- S Matrix of a Directional Coupler- waveguide tees and rat race coupler- Qualitative discussion on: Waveguide Corners- Bends- Twists- Matched loads and movable shorts

UNIT II MICROWAVE TUBES

(9) Transit time effect- Two cavity Klystron amplifier (Reentrant Cavities-Velocity modulation-Bunching -Output Power)- Reflex Klystron (Velocity modulation-Bunching-Output Power)-Helix Traveling-Wave Tubes- Slow-Wave structures- Amplification Process- Convection Current- Axial Electric Field- Wave Modes- Gain Consideration - Cylindrical Magnetron and its Output power

UNIT III MICROWAVE MEASUREMENTS (9)

Slotted line VSWR measurement- impedance measurement- insertion loss and attenuation measurements- measurement of scattering parameters - Return loss measurement using directional coupler-Introduction to vector network analyzer and its uses- Measurement of return loss and insertion loss using Spectrum analyzer having internal reference-Calibration of NA and SA

UNIT IV TRANSFERRED ELECTRON DEVICES AND AVALANCHE TRANSIT-TIME DEVICES

(9) Introduction- Gunn-Effect Diodes – GaAs Diode- Background- Gunn Effect- Ridely-Watkins-Hilsun (RWH) Theory- Differential Negative Resistance- Two-Valley Model Theory-High-Field Domain- Modes of Operation- Amplification- Microwave Generation- Read Diode-

Physical Description- Avalanche Multiplication- Carrier Current $I_o(t)$ and External Current $I_e(t)$- Output Power and Quality Factor- IMPATT Diodes- Physical Structures- Negative Resistance- Power Output and Efficiency- TRAPATT Diodes- Physical Structures- Principles of Operation- Power Output and Efficiency- BARITT Diodes- Physical Description- Principles of Operation- Microwave Performance- Parametric Devices- Physical Structures- Nonlinear Reactance and Manley – Rowe Power Relations- Parametric Amplifiers- Applications

UNIT V STRIP LINES (9)

Introduction- Microstrip Lines- Derivation of Characteristic Impedance of Microstrip Lines using Quasi Static analysis- Losses in Microstrip Lines- Quality Factor Q of Microstrip Lines- Substrate materials-surface wave excitation- Parallel Strip Lines- Characteristic Impedance- Attenuation Losses- Coplanar Strip Lines- Shielded Strip Lines- Problems- Microstrip based broadband matching networks

TOTAL HOURS=45

TEXT BOOKS:

1.Samuel Y-LIAO, " Microwave Devices and Circuits", Prentice Hall of India , 3rd Edition,2003

2.Annapurna Das and Sisir K-Das," Microwave Engineering",Tata McGraw-Hill, 2000.

REFERENCES:

1.R-E- Collin," Foundations for Microwave Engineering", IEEE Press Second Edition,2002 .

2.David M-POZAR ," Microwave Engineering", John Wiley & Sons, 2nd Edition,2003 .

11UBK702 OPTICAL COMMUNICATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- *To introduce the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.*
- *To study about various optical sources and optical detectors and their use in the optical communication system. Finally to discuss about digital transmission and its associated parameters on system performance.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Explain the fundamental concepts on optical fiber communication.

CO2: Describe the different kind of optical losses.

CO3: Illustrate the behavior of optical Fiber communication sources & Coupling.

CO4: Illustrate the behavior of optical communication network receivers.

CO5: Compute the Link, raise time budget of a given optical fiber and describe the SONET/SDH architecture.

UNIT I INTRODUCTION TO OPTICAL FIBERS (9)

Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

UNIT II SIGNAL DEGRADATION IN OPTICAL FIBERS (9)

Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination –Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT III OPTICAL SOURCES AND FIBER COUPLING (9)

Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lencing schemes, Fibre –to- Fibre joints, Fibre splicing.

UNIT IV OPTICAL RECEIVERS (9)

PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation –preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit.

UNIT V DIGITAL TRANSMISSION SYSTEM (9)

Point-to-Point links System considerations –Link Power budget –Rise - time budget –Noise Effects on System Performance-Operational Principles of WDM, Solitons-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network. .

TOTAL : 45

TEXT BOOK

1. Gerd Keiser, “Optical Fiber Communication” McGraw –Hill International, Singapore, 3rd ed., 2000

REFERENCES

1. J.Senior, “Optical Communication, Principles and Practice”, Prentice Hall of India, 1994.
2. J.Gower, “Optical Communication System”, Prentice Hall of India, 2001.

11UBK703 ENGINEERING ETHICS

L	T	P	C
2	0	0	2

COURSE OBJECTIVES:

- *To impart sound knowledge about engineering ethics.*
- *To introduce the concepts of global issues.*
- *To impart engineers responsibility for safety measures.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Create awareness on Engineering Ethics & Human values.
CO2: Understand the social responsibility of an Engineer.
CO3: Appreciate ethical dilemma while discharging duties in professional life.
CO4: Access the safety and risk related issues
CO5: Understand the global issues in ethical practicing

UNIT I Engineering Ethics (9)

Senses of 'engineering ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – kohlberg's theory – gilligan's theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self-interest – customs and religion – uses of ethical theories

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION (9)

Engineering as experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – the challenger case study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY (9)

Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk – the three mile island and chernobyl case studies

UNIT IV RESPONSIBILITIES AND RIGHTS (9)

Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – intellectual property rights (ipr) – discrimination

UNIT V GLOBAL ISSUES (9)

Multinational corporations – environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – sample code of conduct

TOTAL HOURS=30

TEXT BOOK

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 1996-3e

REFERENCES

1. Charles E Harris, Michael S, Protchard and Michael J Rabins "EngineeringEthics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000
2. Laura Schlesinger, "How Could You Do That: The Abdication of Character, Courage, and Conscience", Harper Collins, New York, 1996.
3. Stephen Carter, "Integrity", Basic Books, New York, 1996.
4. Tom Rusk, "The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life", Viking, New York, 1993

11UAK704 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- *To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.*
- *To understand the statistical approach for quality control.*
- *To create an awareness about the ISO and QS certification process and its need for the industries*.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Demonstrate the quality concepts and the applications.
CO 2: Recognize the various quality principles and apply them appropriately.
CO 3: Represent the process with various quality management tools and statistical process charts.
CO 4: Appraise the interacting parameters of the quality by applying the TQM tools such as Benchmarking, FMEA, TPM and QFD for improvement.
CO 5: Recognize elements of Quality management systems of QS 9000 and ISO 14000 for appropriate use.

UNIT I INTRODUCTION (9)

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM,Leadership – Concepts, Role of Senior Management, Quality Council,

UNIT II TQM PRINCIPLES (9)

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure- Business Excellence Model-Rajiv Gandhi National Quality Award

UNIT III STATISTICAL PROCESS CONTROL (SPC) (9)

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV TQM TOOLS (9)

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) –House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT V QUALITY SYSTEMS (9)

Introduction, Consensus, Scope, Selection and Use of the ISO 9000:2000, The ISO 9000 Family, Implementing the ISO 9001:2000 Quality Management System.– Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

TOTAL HOURS=45

REFERENCES:

1. Subburaj Ramasamy,"Total Quality Mangement",Tata McGraw Hill,NewDelhi,2007.
2. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, 1999. (Indian reprint 2002).
3. James R.Evans & William M.Lidsay, "The Management and Control of Quality", (6th Edition),South-Western (Thomson Learning), 2005
4. Narayana V. and Sreenivasan, N.S. "Quality Management – Concepts and Tasks", New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers" ,Wood Head Publishers, 1991.

11UBK704 **MICROWAVE AND OPTICAL LAB**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Analyze various parameters of microwave devices by constructing a microwave bench setup.

CO2: Analyze and verify the characteristics of Reflex klystron, Gunn diode, Directional coupler, horn antenna, Circulator and Isolator.

CO3: Calculate the Gain and Impedance of the given microwave devices.

CO4: Calculate the numerical aperture, losses in fibers and analyze the characteristics of LED, LASER sources and PIN detector experimentally.

CO5: Construct the Data Communication system using fiber optic link.

Microwave Lab Experiments:

1. Impedance measurement- using Smith Chart
2. Antenna gain and pattern measurement
3 S parameter measurements of passive microwave devices (magic tee)
4 Directional Coupler – directivity and coupling coefficient
5. Reflex Klystron mode characteristics
6. VSWR measurement
7. Gunn diode characteristics
8. Measurement of Insertion and attenuation losses

Optical Experiments:

1. Measurement of the numerical aperture
2. LED and Laser diode characteristics
3. Data communication system using a fiber-optic system
4. Attenuation and absorption in optical fiber;
5. Eye pattern measurement using a high bandwidth oscilloscope

TOTAL HOURS=30

11UBK705 **EMBEDDED SYSTEMS LAB**

L	T	P	C
0	0	3	2

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Study of KEIL / IAR workbench tools

CO 2: programming and simulation in KEIL / IAR compilers.

CO 3: Study of ARM.

CO 4: Interfacing ARM processor with I^2C, CAN, Ethernet, RTC.

CO 5: Write RTOs programs

1.Study of KEIL / IAR workbench tools

2. Write C program in KEIL / IAR compilers and simulate LCD display, RTC, Stepper motor control, USART

3. Study of ARM development tools

4. Write C program in to interface ARM processor with I^2C, CAN, Ethernet, RTC

5. Write RTOs programs.

TOTAL HOURS=30

11UBK801 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

At the end of this course, the students will be able to understand

- *Approaches to management and administration*
- *Process of Managing through Objectives through strategies.*
- *Leadership*
- *Globalization*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Demonstrate the knowledge of managerial function, types of managers and managerial roles and skills.

CO 2: Integrate and apply management principles into real time practice.

CO 3: Describe and execute the importance of cooperate social responsibility as a key managerial role.

CO 4: Describe and execute the role of a manager as planner, decision maker and strategist.

CO 5: Demonstrate the role of effective and efficient resourcing of people in the hierarchical structure for smooth functioning of the organization.

UNIT I FOUNDATIONS (9)

Historical developments–approaches to management–Management and Administration–Development of Management Thought–Contribution of Taylor and Fayol–Functions of Management–Types of Business Organisation

UNIT II MANAGERS & ENVIRONMENT (9)

Social responsibility–Planning–Objectives–Setting Objectives– Process of Managing through Objectives– Strategies- Policies & Planning Premises- Forecasting – Decision-making

UNIT III FUNCTIONAL AREA OF ORGANISATION (9)

Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process - Techniques – HRD – Managerial Effectiveness

UNIT IV MOTIVATION & DIRECTIONS (9)

Objectives– Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication

UNIT V CONTROLLING STRATEGIES (9)

System and process of Controlling–Requirements for effective control– Budget as Control Technique–Information Technology–Computers in handling the information–Productivity-Problems and Management– Control of Overall Performance – Direct and Preventive Control–Reporting–The Global Environment–Globalization and Liberalization–International Management and Global theory of Management

TOTAL HOURS : 45

REFERENCES:

1. Harold Kooritz & Heinz Weihrich "Essentials of Management"- Tata McGraw-Hill-7th edn-2007.
2. Joseph L Massie "Essentials of Management"- Prentice Hall of India- (Pearson) Fourth Edition- 2003-
3. Tripathy PC And Reddy PN- " Principles of Management"- Tata McGraw-Hill- 1999-
4. Decenzo David- Robbin Stephen A- "Personnel and Human Reasons Management"- Prentice Hall of India- 1996

ELECTIVES

11UBE501 COMPUTER ARCHITECTURE AND ORGANIZATION

L	T	P	C
3	0	0	3

Course objectives:

- *To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.*
- *To study in detail the different types of control and the concept of pipelining.*
- *To study the hierarchical memory system including cache memories and virtual memory.*
- *To study the different ways of communicating with I/O devices and standard I/O interfaces.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
CO2: Study in detail the different types of control and the concept of pipelining.
CO3: Study the hierarchical memory system including cache memories and virtual memory.
CO4: Study the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I INTRODUCTION (9)

Evolution of Computer Systems-Computer Types-Functional units-Basic operational concepts-Bus structures- Memory location and addresses-memory operations- Addressing modes-Design of a computer system- Instruction and instruction sequencing, RISC versus CISC.

UNIT II CENTRAL PROCESSING UNIT (9)

Introduction-Arithmetic Logic Unit - Fixed point arithmetic, floating point arithmetic-Execution of a complete instruction-Basic concepts of pipelining.

UNIT III CONTROL UNIT DESIGN (9)

Introduction-Control Transfer-Fetch cycle - Instruction Interpretation & Execution - Hardwired control -Microprogrammed control.

UNIT IV MEMORIES AND SUBSYSTEMS (9)

Semiconductor memory - Static and Dynamic -Associative memory- Cache memory- Virtual memory-Secondary memories-Optical magnetic tape & magnetic disks & controllers.

UNIT V I/O PROCESSING (9)

Introduction-Data transfer techniques- Bus Interface- I/O Channel-I/O Processor, I/O devices - Direct memory access.

TOTAL HOURS=45

REFERENCES

1. P.Pal Chaudhuri, "Computer Organization and Design" , 2nd Edition, PHI ‘ 2003
2. William Stallings , “Computer Organization and Architecture – Designing for Performance”, PHI, 2004.
3.Carl Hamacher,”Computer Organization”,Fifth Edition,McGrawHill International Edition, 2002

11UBE502 INTELLECTUAL PROPERTY RIGHTS (IPR)

L	T	P	C
3	0	0	3

Course objectives:

- *To impart sound knowledge about rights and property rights.*
- *To introduce the concepts of GATT, WIPO and WTO.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Understand the importance of intellectual property rights and its types.

CO2: Describe the copyright, related issues and the various types of international agreement for the protection of IPR.

CO3: Describe the significance of patent, classification of inventions and applications.

UNIT I INTRODUCTION (9)

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).

UNIT II IP AND PATENTS (9)

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.

UNIT III INTELLECTUAL PROPERTY (9)

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV WTO (9)

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V CASE STUDIES (9)

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TOTAL HOURS=45

TEXT BOOK

1. Subbaram N.R. " Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES

1. Eli Whitney, United States Patent Number : 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today : Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. [www.ipmatters.net/features/000707_gibbs.html.

11UBE503 MEDICAL ELECTRONICS

L	T	P	C
3	0	0	3

Course objectives

To make students to understand the applications of electronics in diagnostic and therapeutic area.

- *To study the methods of recording various biopotentials*
- *To study how to measure biochemical and various physiological information*
- *To understand the use of radiation for diagnostic and therapy*
- *To understand the need and technique of electrical safety in Hospitals*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe the various bio potential recording such as EMG, ECG, EOG and monitoring systems.
CO 2: Describe the operating principles of different blood flow measurement and pulmonary function analyzer.
CO 3: Illustrate the working of medical; units which will help to restore normal functioning of organs.
CO 4: Explain the significance of use of radiation for diagnostic and a therapeutic application.
CO 5: Describe the importance of computers in medical field.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING (9)

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

UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT (9)

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 ASSIST DEVICES AND BIO-TELEMETRY (9)

Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry, Radio-pill and Tele-stimulation, Dialysers, Heart Lung Machine,Oxygenators.

UNIT IV RADIOLOGICAL EQUIPMENTS AND MEDICAL IMAGING (9)

Ionosing radiation,X-ray, Diagnostic X-ray equipments, Computer Axial Tomography, MRI and NMR scan, , Radio Isotopes in diagnosis, Radiation Therapy, Ultrasonic Imaging systems , Medical Thermograph.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION (9)

E-Health, Pattern Recognition techniques , Endoscopy , Laser in medicine, Diathermy units, Electrical safety in medical equipment, Application of VLSI design tools in Bio electronics.

TOTAL HOURS= 45

TEXT BOOKS

1. Leslie Cromwell, “Biomedical instrumentation and measurement”, Prentice Hall of India, New Delhi, 2002.

REFERENCES

1. Khandpur, R.S., “Handbook of Biomedical Instrumentation”, TATA McGraw-Hill, New Delhi, 1997.
2. Joseph J.Carr and John M.Brown, “Introduction to Biomedical equipment Technology”, John Wiley and Sons, New York, 1997.

11UBE504 DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

Course Objectives

To introduce the student to various image processing techniques.

- *To study the image fundamentals and mathematical transforms necessary for image processing*
- *To study the image enhancement, image restoration and image compression procedures*
- *To study the image segmentation and representation techniques*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Illustrate the basic fundamentals of Image processing.
CO 2: Compute the different types of image transforms.
CO 3: Apply different image enhancement and restoration techniques.
CO 4: Apply image segmentation & representation techniques.
CO 5: Acquire knowledge of image compression algorithms.

UNIT I DIGITAL IMAGE FUNDAMENTALS (9)

Elements of digital image processing systems, Elements of visual perception, psycho visual model, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB,HSI models, Image acquisition and sampling, Quantization, Image file formats, Two-dimensional convolution, correlation, and frequency responses.

UNIT II IMAGE TRANSFORMS (9)

1D DFT, 2D transforms – DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Radon, and Wavelet Transform.

UNIT III IMAGE ENHANCEMENT AND RESTORATION (9)

Histogram modification and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic filters, Homomorphic filtering,Color image enhancement. Image Restoration – degradation model, Unconstrained and Constrained restoration, Inverse filtering, Wiener filtering, Geometric transformations – spatial transformations, Gray- Level interpolation.

UNIT IV IMAGE SEGMENTATION AND RECOGNITION (9)

Edge detection. Image segmentation by region growing, region splitting and merging, edge linking, Morphological operators: dilation, erosion, opening, and closing. Image Recognition – Patterns and pattern classes, matching by minimum distance classifier, Statistical Classifier. Matching by correlation, Neural network application for image recognition.

UNIT V IMAGE COMPRESSION (9)

Need for image compression, Huffman, Run Length Encoding, Arithmetic coding, Vector Quantization, Block Truncation Coding. Transform Coding – DCT and Wavelet. Image compression standards.

TOTAL HOURS: 45

REFERENCES

1. Rafael C. Gonzalez, Richard E.Woods, “Digital Image Processing”, Pearson Education, Inc., Second Edition, 2004.
2. Anil K. Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 2002.
3. David Salomon, “Data Compression – The Complete Reference”, Springer Verlag New York Inc.,2nd Edition, 2001
4. Rafael C. Gonzalez, Richard E.Woods, and Steven Eddins, “Digital Image Processing using MATLAB”, Pearson Education, Inc., 2004.

11UBE505 COMPUTER HARDWARE AND INTERFACING

L	T	P	C
3	0	0	3

Course objectives

- *To introduce issues related to CPU and memory.*
- *To understand the components on the motherboard*
- *To understand different storage media*
- *To introduce the features of different I/O peripheral devices and their interfaces*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe the issues related to CPU and memory.
CO 2: Describe the features of different I/O peripheral devices & their interfacing.
CO 3: Identify different storage media.
CO 4: Recognize the components on mother board
CO5: Explain the concepts of system bus and bus standards.

UNIT I CPU AND MEMORY (9)

CPU essentials – processor modes – modern CPU concepts – Architectural performance features –Intel's CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations– memory considerations– memory types – memory techniques – selecting and installing memory.

UNIT II MOTHER BOARDS (9)

Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT III STORAGE DEVICES (9)

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout – IDE drive standard and features – Hard drive electronics – CD-ROM drive – construction – CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT IV I/O PERIPHERALS (9)

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues – DirectX – mice – modems – keyboards – sound boards – audio bench marks.

UNIT V BUS ARCHITECTURE (9)

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

TOTAL HOURS=45

REFERENCE BOOKS

1.Stephen J.Bigelow, “Trouble Shooting, maintaining and Repairing PCs”, Tata McGraw-Hill, New Delhi, 2001.
2.Craig Zacker & John Rourke, “The complete reference:PC hardware”, Tata McGraw-Hill, New Delhi, 2001.
3. Mike Meyers, “Introduction to PC Hardware and Trouble shooting”,Tata McGraw Hill, New Delhi , 2003.
4.B.Govindarajulu, “IBM PC and Clones hardware trouble shooting and maintenance”, Tata McGraw-Hill, New Delhi, 2002.

11UBE601 **RISC ARCHITECTURE**

L	T	P	C
3	0	0	3

Course objectives:

- *To introduce the concepts and architecture of RISC processor*
- To introduce the concepts in internal programming model of RISC processor family of processor
- *To introduce the programming techniques.*
- *To introduce the basic architecture of RISC family of processors.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Describe the RISC architecture, instructions and write the ARM assembly programming.
CO2: Understand the RISC memory interface and architecture support for OS.
CO3: Expose the various real time application of embedded RISC.

UNIT I RISC OVERVIEW AND RISC PRINCIPLES (9)

Processor Architecture -RISC versus CISC - Advantages of High-Level Languages - Processor Design Issues - Number of Addresses – The Load/Store Architecture - Processor Registers - Flow of Control - Procedure Calls - Handling Branches - Instruction Set - Design Issues - Evolution of CISC Processors – RISC Design Principles

UNIT II RISC ARCHITECTURES (9)

MIPS Architecture - Introduction -Registers –Register Usage Convention -Addressing Modes - Instruction Format –Memory Usage -SPARC Architecture-Registers -Addressing Modes - Instruction Format -Instruction Set -Procedures and Parameter Passing- PowerPC Architecture - Register Set -Addressing Modes - Instruction Format - Instruction Set

UNIT III RISC ITANIUM ARCHITECTURE (9)

Introduction –Registers-Addressing Modes- Procedure Calls - Instruction Format - Instruction-Level Parallelism -Instruction Set – Handling Branches - Speculative Execution - Branch Prediction Hints- ARM Architecture - Introduction -Registers- Addressing Modes -Instruction Format -Instruction Set

UNIT IV MIPS ASSEMBLY LANGUAGE (9)

Assembly Language Overview -Introduction - Assembly Language Statements- SPIM System Calls - SPIM Assembler Directives – MIPS Program Template – Data Movement Instructions - Load Instructions - Store Instructions -Addressing Modes - Procedures and the Stack - Stack Implementation in MIPS

UNIT V ADDRESSING MODES AND INSTRUCTION SET (9)

Addressing Modes - Arithmetic Instructions- Conditional Execution - Logical Operations - Shift Operations – Recursion - Floating-Point Operations

TOTAL HOURS=45

REFERENCES:

1. Sivarama P. Dandamudi, "Guide to RISC Processors for Programmers and Engineers" 2005 Springer
2. Gerry Kane and Joe Heinrich MIPS RISC Architecture, 2nd edition.
3. J.C.Heudin,C.Panetto “RISC Architectures” , Chapman and Hall

11UBE602 ADVANCED MICROPROCESSORS

L	T	P	C
3	0	0	3

Course objectives

• To introduce the concepts in internal programming model of Intel family of microprocessors.
• To introduce the programming techniques using MASM, DOS and BIOS function calls.
• To introduce the basic architecture of Pentium family of processors.
• To introduce the architecture programming and interfacing of 16 bit microcontrollers.

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to
CO 1: Apply the concept in internal programming model of the microprocessor.
CO 2: Describe the memory paging mechanism of microprocessor.
CO 3: Describe the software model of Pentium microprocessor.
CO 4: Describe the Pentium Hardware.
CO 5: Apply the concept in internal programming model of Motorola microprocessor.

UNIT I ADVANCED MICROPROCESSOR ARCHITECTURE (9)

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 MODULAR PROGRAMMING AND ITS CONCEPTS (9)

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

UNIT III PENTIUM PROCESSORS (9)

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

UNIT IV 16-BIT MICRO CONTROLLER (9)

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 RISC PROCESSORS AND ARM (9)

RISC revolution–Characteristics of RISC Architecture –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 –ARM processors–ARM registers–ARM instructions–ARM built-in shift mechanism –ARM branch instructions– sequence control–Data movement and memory reference instructions

TOTAL HOURS=45

TEXT BOOK

1. Barry B.Brey, The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and interfacing, Prentice Hall of India Private Limited, New Delhi, 2003
2. John Peatman, Design with Microcontroller McGraw Hill Publishing Co Ltd, New Delhi.
3. Alan Clements, "The principles of computer Hardware", Oxford University Press, 3rd Edition, 2003.

REFERENCE BOOKS

1. Rajkamal, The concepts and feature of micro controllers 68HC11, 8051 and 8096; S Chand Publishers, New Delhi.

11UBE603 INFORMATION THEORY AND CODING

L	T	P	C
3	0	0	3

Course objectives:

- *To deeply understand the mathematics of Information Theory and its physical meaning*
- *To understand various channel coding techniques*
- *Can apply the knowledge to real problems in communication applications*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Understand the mathematics of Information Theory and its physical meaning
CO 2: Understand various channel coding techniques
CO 3: Apply the knowledge to real problems in communication applications

UNIT I INFORMATION THEORY (9)

Information –Uncertainty, Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memory less channels – Channel coding theorem, Channel capacity theorem, Shannon limit.

UNIT II SAMPLING AND WAVEFORM CODING (9)

Base band and band pass sampling theorems, reconstruction from samples, Practical aspects of sampling and signal recovery, TDM, PCM, Channel noise and error probability, DPCM, ADPCM and DM, Coding speech at low bit rates, Prediction and adaptive filters, Base band shaping for data transmission, PAM signals and their power spectra Nyquist criterion, ISI and eye pattern Equalization.

UNIT III SOURCE CODING: TEXT, AUDIO AND SPEECH (9)

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MPEG Audio Coders, Dolby Coders - Speech: Channel Vocoder, Linear Predictive Coding

UNIT IV SOURCE CODING: IMAGE AND VIDEO (9)

Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I, B, P frames, Motion estimation, Motion compensation, H.261, MPEG standard

UNIT V ERROR CONTROL CODING (9)

Introduction, Forward & Backward error Correction , Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Parity Check Matrix, Syndrome decoding, Cyclic codes - CRC Codes, Circuit implementation of Cyclic Codes, Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

TOTAL HOURS=45

REFERENCES

1. Ranjan Bose "Information Theory, Coding & Cryptography", TMH , Part I, 2002, New Delhi.
2. Fred Halsall, “Multidedia Communications: Applications, Networks, Protocols and Standards”, Perason Education Asia, 2002
3. K Sayood, “Introduction to Data Compression” 3/e, Elsevier 2006
4. S Gravano, “Introduction to Error Control Codes”, Oxford University Press 2007
5. Amitabha Bhattacharya, “Digital Communication”, TMH 2006
6. Simon Haykin, John Wiley & Sons, “Digital Communications”, 2001
7. Simon Haykin, “Communication Systems”, John Wiley and Sons, 4th Edition, 2001.

1UBE604 **GENETIC ALGORITHMS**

L	T	P	C
3	0	0	3

Course objectives:

- *To impart sound knowledge about the genetic technology.*
- *To introduce the fundamental concepts of genetic algorithm and optimization.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe the basic concepts of genetic algorithm and modeling.

CO 2: Describe the optimization algorithms.

CO 3: Implement low level operation and knowledge based techniques in genetic algorithm.

UNIT I FUNDAMENTALS OF GENETIC ALGORITHM (9)

A brief history of evolutionary computation-biological terminology – search space -encoding, reproduction-elements of genetic algorithm-genetic modeling-comparison of GA and traditional search methods.

UNITII GENETIC TECHNOLOGY (9)

steady state algorithm - fitness scaling - inversion. Genetic programming – Genetic Algorithm in problem solving

UNIT III GENETIC ALGORITHM IN ENGINEERING AND OPTIMIZATION (9)

natural evolution –Simulated annealing and Tabu search .Genetic Algorithm in scientific models and theoretical foundations.

UNIT IV IMPLEMENTING A GENETIC ALGORITHM (9)

computer implementation - low level operator and knowledge based techniques in Genetic Algorithm.

UNIT V APPLICATIONS OF GENETIC BASED MACHINE LEARNING (9)

Genetic Algorithm and parallel processors, composite laminates, constraint optimization, multilevel optimization, real life problem.

TOTAL HOURS=45

REFERENCES

1. Melanie Mitchell, 'An introduction to Genetic Algorithm', Prentice-Hall of India, New Delhi, Edition:2004

2. David.E.Golberg, 'Genetic algorithms in search, optimization and machine learning', Addision-Wesley-1999

3. S.Rajasekaran and G.A Vijayalakshmi Pai,'Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and Applications', Prentice Hall of India, New Delhi-2003.

4. Nils.J.Nilsson,'Artificial Intelligence- A new synthesis', Morgan Kauffmann Publishers Inc, San Francisco, California, 1998.

11UBE605 NEURAL NETWORKS AND FUZZY LOGIC

L	T	P	C
3	0	0	3

Course Objectives

- *To expose the students to the concepts of feed forward neural networks*
- *To provide adequate knowledge about feed back neural networks.*
- *To teach about the concept of fuzziness involved in various systems. To provide adequate knowledge about fuzzy set theory.*
- *To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.*
- *To provide adequate knowledge of application of fuzzy logic control to real time systems.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Acquire knowledge about the basics of neural network concepts.
CO 2: Familiarize on the learning concepts of neural networks.
CO 3: Define various basics of Fuzzy systems.
CO 4: Study of Fuzzy logic control & its applications.

UNIT I ARCHITECTURES (9)

Introduction – Biological neuron – Artificial neuron – Neuron modeling – Learning rules – Single layer – Multi layer feed forward network – Back propagation – Learning factors.

UNIT II NEURAL NETWORKS FOR CONTROL (9)

Feed back networks – Discrete time hop field networks – Transient response of continuous time networks – Applications of artificial neural network - Process identification – Neuro controller for inverted pendulum.

UNIT III FUZZY SYSTEMS (9)

Classical sets – Fuzzy sets – Fuzzy relations – Fuzzification – Defuzzification – Fuzzy rules.

UNITIV FUZZY LOGIC CONTROL (9)

Membership function – Knowledge base – Decision-making logic – Optimisation of membership function using neural networks – Adaptive fuzzy system – Introduction to genetic algorithm.

UNIT V APPLICATION OF FLC (9)

Fuzzy logic control – Inverted pendulum – Image processing – Home heating system – Blood pressure during anesthesia – Introduction to neuro fuzzy controller.

TOTAL HOURS: 45

TEXT BOOKS

1. Jacek M. Zurada, 'Introduction to Artificial Neural Systems', Jaico Publishing home, 2002.
2. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', Tata McGraw Hill, 1997.

REFERENCES

1. Laurance Fausett, Englewood cliffs, N.J., 'Fundamentals of Neural Networks', Pearson Education,
1992.
2. H.J. Zimmermann, 'Fuzzy Set Theory & its Applications', Allied Publication Ltd., 1996.
3. Simon Haykin, 'Neural Networks', Pearson Education, 2003.
4. John Yen & Reza Langari, 'Fuzzy Logic – Intelligence Control & Information', Pearson Education, New Delhi, 2003.

11UBE606 NUMERICAL METHODS

L	T	P	C
3	0	0	3

Course Objectives

At the end of the course, the students would be acquainted with the basic concepts in numerical methods ,

- *The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigenvalue problem of a matrix can be obtained numerically where analytical methods fail to give solution.*
- *When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.*
- *The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.*
- *Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Identify the concept of algebraic, transcendental equations and the system of simultaneous equations.

CO 2: Analyze the concept of interpolation and approximation of polynomials

CO 3: Develop the concept of differentiation and integration numerically

CO 4: Solve ordinary differential equations with initial values.

CO 5: Solve boundary value problems in ordinary and partial differential equations

UNIT I CURVE FITTING AND THEORY OF EQUATIONS (9)

Empirical laws and curve fitting- linear law- method of group averages- principle of Least squares- fitting straight line, parabola, exponential curve- method of moments- theory of equations- Relation between the roots and coefficients of polynomial equation- equations with real coefficients and imaginary roots equations with rational coefficients and irrational roots- symmetric of roots- Transformation of equations- Reciprocal equations.

UNIT II SOLUTION OF EQUATIONS (9)

Solution of numerical algebraic and transcendental equations- the Bisection method- Iteration method- RegulaFalsi method- Newton Raphson method- Horner's method- Solution of Simultaneous Linear algebraic equations- Gauss Elimination method- Gauss Jordan method- Crout's method- Gauss Jacobi method- Gauss Seidel method- Relaxation method.

UNIT III DIFFERENCE CALCULUS (9)

Finite differences- Forward, Backward and central difference operator- shifting operator- Properties and relation between operators- Interpolation- Newton's forward and Backward difference interpolation formula- Gauss forward and backward difference interpolation formula- Bessel's Laplace and Everett formula.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION (9)

Interpolation with unequal intervals- Divided differences- Newton's divided Difference formula- Lagrange's interpolation formula-inverse interpolation- Numerical Differentiation- Newton's forward and backward differentiation formula- Numerical Integration- The trapezoidal rule- Simpson's 1/3rd and 3/8th rule- Difference equations- solution of linear homogeneous difference equation with constant coefficients.

UNITV NUMERICAL SOLUTION OF DIFFERENTIAL EQUATION (9)

Numerical solutions of ordinary differential equations- Taylor series method- Picards method- Euler's Method- Fourth order Runge Kutta method- Milne's and Adam's predictor- Corrector methods- Numerical solution of elliptic equation by Leibmann's method- solution of parabolic equation by Bender – Schmidt method- Solution of hyperbolic equation.

TOTAL HOURS: 45

REFERENCES

1. Curtis.F.Gerald, Patrick.O Wheatly," Applied Numerical Analysis", 6th Edition, Pearson Education New Delhi 2002.
2. John Mathews, Kurtis.D. Fink, "Numerical Methods using MATLAB", PHI 1998.
3. Kandasamy.P , Thilagavathy.K and Gunavathy.k, "Numerical methods", S.Chand and company Ltd., New Delhi, 2003.
4. Jain.M.k. Iyengar, S.R.K.Jain, Jain.R.K, "Numerical Methods for Scientific and Engineering Computation", 4th Edition New age International Publishers, New delhi, 2003.
5. Sastry.S.S, "Introductory Methods of Numerical analysis", PHI , 2001.

11UBE607 TELEVISION AND VIDEO ENGINEERING

L	T	P	C
3	0	0	3

Course objectives:

- *To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes*
- *To study the principles of Monochrome Television Transmitter and Receiver systems.*
- *To study the various Color Television systems with a greater emphasis on PAL system.*
- *To study the advanced topics in Television systems and Video Engineering*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Explain the fundamentals of analysis and synthesis of TV Pictures, Composite Video Signal, Picture tubes and Television Camera Tubes.

CO 2: Describe the working principles of Monochrome Television Transmitter and Receiver systems.

CO 3: Define the terminologies associated with Color Television principles

CO 4: Describe the TV standards with greater emphasis on PAL system.

CO 5: Illustrate the applications of television and other latest TV related developments.

UNIT I FUNDAMENTALS OF TELEVISION (9)

Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension- horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth.

UNIT II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER (9)

TV transmitter–TV signal propagation–Interference–TV transmission Antennas – Monochrome TV receiver–RF tuner–UHF, VHF tuner-Digital tuning techniques-AFT-IF subsystems-AGC–Noise cancellation-Video and sound inter carrier detection-vision IF subsystem-video amplifiers requirements and configurations - DC re-insertion-Video amplifier circuits-Sync separation–typical sync processing circuits- Deflection current waveform–Deflection Oscillators–Frame deflection circuits–requirements-Line Deflection circuits – EHT generation – Receiver Antennas.

UNIT III ESSENTIALS OF COLOUR TELEVISION (9)

Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence-purity and static and dynamic convergence adjustments- pincushion correction techniques-automatic degaussing circuit- grey scale tracking – colour signal transmission- bandwidth-modulation of colour difference signals – weighting factors- Formation of chrominance signal.

UNIT IV COLOUR TELEVISION SYSTEMS (9)

NTSC colour TV system-NTSC colour receiver- limitations of NTSC system–PAL colour TV system – cancellation of phase errors-PAL–D colour system-PAL coder–Pal-Decolour receiver-chromo signal amplifier-separation of U and V signals- colour burst separation – Burst phase Discriminator–ACC amplifier-Reference Oscillator- Ident and colour killer circuits- U and V

demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.

UNIT V ADVANCED TELEVISION SYSTEMS (9)

Satellite TV technology-Cable TV-Tele Text broadcast receiver–digital television– Transmission and reception- projection Television–Flat panel display TV receiver–Stereo sound in TV–3D TV – EDTV–Digital equipments for TV studios-HDTV-Remote control circuits, MATV, CATV and CCTV system

TOTAL HOURS=45

TEXT BOOKS

1. R.R.Gulati, " Monochrome Television Practice, Principles, Technology and servicing , Second edition, New age International Publishes, 2004
3. R.R.Gulati "Monochrome and colour television ", New Age International Publisher, 2003

REFERENCES

1. A.M Dhake, "Television and Video Engineering", Second edition, TMH, 2003.
2. S.P.Bali, " Colour Television, Theory and Practice", TMH, 1994

11UBE701 **ASIC DESIGN**

L	T	P	C
3	0	0	3

Course objectives:

To make the student learn

- *Fundamentals of ASIC and its design methods,.*
- *Programmable ASIC.*
- *Back end design and Testing.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Introduce the concepts of ASIC Design
CO 2: Understand different types of programmable ASIC
CO 3: Study the different types of FPGA and ASIC structures.
CO 4: Design ASIC for real time applications

UNIT I INTRODUCTION TO ASICS (9)

Types of ASICs – design flow – case study – ASIC cell Libraries –Programmable ASICs – antifuse – Static RAM – EPROM & EEPROM Technology – Specifications –FPGA Economics.

UNIT II PROGRAMMABLE ASICS (9)

Actel ACT – ACT1 Logic module – Shannon's expansion theorem – Multiplexer logic as Function Generators – ACT 2 and ACT 3 Logic Modules – Timing Modules and Critical Paths – Xilinx LCA – XC3000 CLB– XC4000 Logic Block – XC5200 Logic Block – Xilinx CLB Analysis – Altera FLEX – Altera MAX – Logic Expanders – Timing Model – Power dissipation in complex PLDs – DC output – AC output – DC input – AC input – Clock input – power input.

UNIT III ASIC CONSTRUCTION (9)

Physical design – CAD Tools – Methods and Algorithms – System Partitioning – Estimating ASIC Size – Power Dissipation – Switching current – short circuit current – subthreshold and leakage current -FPGA Partitioning – ATM simulator – Automatic partitioning with FPGAs - Partitioning Methods.

UNIT IV BACKEND DESIGN (9)

Floor planning Methods – Block placement and channel definition – Global routing – switch box routing – power distribution – clock distribution – floor planning – design validation – Off chip connections – packages – The I/O Architecture – Pad design.

UNIT V TESTING (9)

The importance of test – Boundary scan test–BST Cells–BST Registers–Instruction Decoder-TAP Controller–Boundary scan controller–A Simple boundary scan example-ATPG–The D–calculus–A Basic ATPG Algorithm–The PODEM Algorithm–controllability and observability-Scan test – Built in self Test.

TOTAL HOURS=45

REFERENCES

1. Michael John Sebastian Smith, "Applications Specific Integrated Circuits ", Pearson Education,Ninth Indian Reprint, 2004.
2. Wayne Wolf, "Modern VLSI Design" , Pearson Education, Second Indian Reprint,2003
3. Neel H.E.Weste Eshraghian, "Principles of CMOS VLSI Design", Addison Wesley, 1999.

11UBE702 SATELLITE COMMUNICATION

L	T	P	C
3	0	0	3

Course objectives:

- *To study the Orbital Mechanics*
- *To study the space craft subsystems, earth stations and space links*
- *To study the multiple access techniques and network aspects*
- *To study the applications of satellite communication*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe the basic concepts of Orbit Dynamics.
CO 2: Describe the space segment and design the satellite link.
CO3: Compare various Satellite Access systems.
CO4: Familiarize on the concepts of satellite test equipments.
CO5: Familiarize on Various applications of Satellites.

UNIT I ORBITAL MECHANICS (9)

Kepler's laws of motion, Orbits, Orbit Equations, Orbit Description, Locating the Satellite in the Orbit and with Respect to Earth, Orbital Elements-Look Angle Determination and Visibility-Orbital Perturbations, Orbit Determination, Launch Vehicles, Orbital Effects in Communication System - Performance Attitude control; Satellite launch vehicles. spectrum allocations for satellite systems.

UNIT II SPACECRAFT SUB SYSTEMS AND EARTH STATION (9)

Spacecraft Subsystems, Altitude and Orbit Control, Telemetry and Tracking, Power Systems, Communication Subsystems, Transponders, Antennas, Equipment Reliability, Earth Stations, Example of payloads of operating and planned systems.

UNIT III SPACE LINKS (9)

The Space Link, Satellite Link Design - Satellite uplink -down link power Budget, Basic Transmission Theory, System Noise Temp, G/T Ratio, Noise Figure, Downlink Design, Design of Satellite Links for Specified C/N - Microwave Propagation on Satellite-Earth Paths. Interference between satellite circuits, Energy Dispersal, propagation characteristics of fixed and mobile satellite links.

UNIT IV MULTIPLE ACCESS TECHNIQUES AND NETWORK ASPECTS (9)

Single access vs. multiple access (MA).Classical MA techniques: FDMA, TDMA. Single channel per carrier (SCPC) access-Code division multiple access (CDMA). Demand assignment techniques. Examples of MA techniques for existing and planned systems (e.g. the satellite component of UMTS).Mobile satellite network design, ATM via satellite. TCP/IP via satellite - Call control, handover and call set up procedures. Hybrid satellite-terrestrial networks

UNIT V SERVICES AND APPLICATIONS (9)

Fixed and mobile services - Multimedia satellite services - Advanced applications based on satellite platforms - INTELSAT series - INSAT, VSAT, Remote Sensing - Mobile satellite service: GSM. GPS, INMARSAT, Navigation System, Direct to Home service (DTH), Special services, E-mail, Video conferencing and Internet connectivity

TOTAL HOURS=45

REFERENCE BOOKS

1. Dennis Roddy, “Satellite Communications”, 3rd Edition, Mc Graw Hill International Editions, 2001
2. Bruce R.Elbert, “Introduction to Satellite Communication” , Artech House Inc.,1999.
3. Timothy Pratt, Charles W. Bostian, Jeremy Allnutt, “Satellite Communications”, 2nd Edition, Wiley, John& Sons, 2002
4. Wilbur L.Pritchard, Hendri G.Suyderhood, Robert A.Nelson, “Satellite Communication Systems Engineering”, 2nd Edition, Prentice Hall, New Jersey, 1993
5. Tri T.Ha, "Digital satellite communication", 2nd Edition, McGraw Hill, New york.1990

11UBE703 RF SYSTEMS AND MEMS

L	T	P	C
3	0	0	3

Course objectives:

- *To impart the sound knowledge about the basic concepts of RF MEMS.*
- *To introduce the concepts of RF-IC'S.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Familiarize the concepts of physical aspects and impedance mismatch effects in the design of RF circuits

CO 2: Gain knowledge on Microwave substrates, MEMS switches and Resonators.

CO 3: Explore the knowledge on various modeling of RFMEMS Filters & Phase Shifters.

UNIT I WIRELESS RF SYSTEMS (9)

Introduction to wireless systems – Design & performance issue –Wireless Antennas – Propagation and Fading – Power Amplifier – Diode Mixer – SAW Filters –Frequency Synthesizer – PLL Analysis – Oscillator Phase Noise – Receiver Architecture – Dynamic Range– FM broad Cast Receiver – Digital Cellular Receiver – Direct Conversion GSM Receiver.

UNIT II RF ICS (9)

Introduction to communication circuits – Linearity & Distortion in RF Circuits –Intercept Points – Review of Technology Bipolar transistors – current dependence – High frequency effects– Bipolar transistor design considerations – CMOS transistors – NMOS – CMOS small signal models –Square Law Equations .

UNIT III RFIC DESIGN (9)

Design of Passive circuit elements in IC – Introduction – Sheer resistance & Skin effect – Parasitic L & C – Current Handling in metal lines Inductors – capacitors – Multi level inductors – Effect of Transmission lines – packaging.

UNIT IV RF MEMS (9)

Switches– Actuation Mechanism – Dynamics of switch operation – design considerations – MEMS inductors & Capacitors – Micro-machined Inductors – Effect of Inductor Layout – Approaches for Improving Quality Factors – Folded Inductors – Variable Inductors – Polymer Inductor – Gap tuning – Area Tuning – Dielectric Tunable Capacitor – Fab techniques.

UNIT V RF MEMS RELAYS AND SWITCHES. (9)

Switch parameters. Actuation mechanisms. MEMS inductors and capacitors. Micromachined RF filters. Modeling of mechanical filters. MEMS phase shifters. Microstrip antennas – design parameters. Micromachining to improve performance. MEMS for RF Applications.

TOTAL HOURS=45

REFERENCES

1.David.M.Pozar, "Microwave and RF Design of Wireless Systems", John Wiley, 2001

2.John Rogers & Calvin Plett, "Radio Frequency Integrated Circuits", Artech House, 2003

3.Vijay.K.Varadhan, K.J Vinoy, K.A. Jose, "RFMEMS and Their Applications", John Wiley, 2002

4.www.trenster.com, www.activewaveinc.com, www.chipcon.com

5.www.ti.com, www.microcircuits.com

11UBE704 **CDMA AND OFDM**

L	T	P	C
3	0	0	3

Course objectives:

- *To impart sound knowledge about the multiple access.*
- *To introduce the concepts of digital modulation and propagation models.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Impart knowledge about various multiple access

CO 2: Analyse concepts of digital modulation and propagation models

CO 3: Know the concepts of channel Interference and System Capacity

UNITI RANDOM SIGNAL THEORY (9)

Joint Probability, Statistical independence, Cumulative Distribution function and Probability Density function, Error function, Rayleigh and Gaussian Probability Density, Stationary and Ergodic Process, Power Spectral Density of digital data. Base band Data Transmission: Base band Signal receiver, Probability of error, Optimum filter, Matched filter, Coherent reception, ISI and Turbo Equalization.

UNIT II DIGITAL MODULATION TECHNIQUES (9)

Introduction to single-carrier, multi-carrier and spread-spectrum modulation for digital transmission. Binary and multi-level amplitude-shift keying (ASK) Performance Analysis of BPSK, DPSK, QPSK, Mary PSK, BFSK, M-ary FSK, MSK, QAM,

UNIT III PROPAGATION MODELS (9)

OFDM for wireless transmission. Propagation & Fading: Propagation path loss, Free-space propagation model, Outdoor propagation models (Okumura model & Hata model), Indoor propagation models (Partition Losses in the same floor and between floors), Multipath fading, time dispersive and frequency dispersive channels, delay spread and coherence bandwidth, LCR and ADF.

UNIT IV MOBILE RADIO INTERFERENCES & SYSTEM CAPACITY (9)

Co-channel Interference and System Capacity, Channel planning for Wireless Systems, Adjacent channel interferences, Power control for reducing interference, Inter-symbol Interference; The Cellular Concept: Frequency Assignment and Channel Assignment, Frequency Reuse, Handoff, Sectoring, Microcell zone, Spectral efficiency,

UNIT V MULTIPLE ACCESS TECHNIQUES (9)

FDMA, TDMA, CDMA, OFDMA, OFDM-CDMA, MIMO-OFDM and QOS issues. Multi-carrier modulation and orthogonal frequency division multiplexing (OFDM). Applications of OFDM in digital broadcasting (e.g.DAB and DVB-T), wireless computer networks (e.g. IEEE802.11) and ASDL modems.Multiuser Detection: Linear and Non-Linear Multiuser Detectors, BER Analysis, Turbo Multiuser Receiver, Iterative Interference Cancellation, Capacity Analysis, BER,Analysis, Multiuser Detection for 4G wireless Systems.

TOTAL HOURS=45

REFERENCES

1. D. Tse, P. Viswanath, “Fundamentals of Wireless Communications”, Cambridge Press, (2005)
2. G. L. Stuber, “Principles of Mobile Communication”, Kluwer Acdemic, (1996)
3. J. G. Proakis, “Digital Communications”, McGraw-Hill, (1995)
4. T. S. Rappaport, “Wireless Communications: Principles and Practice”, Prentice Hall, (1996)
5. A. J. Viterbi, “CDMA Systems: Principles of Spread Spectrum Communication”, Addison Wesley, (1995)
6. S. Verdu, “Multiuser Detection”, Cambridge University Press, (1998)
7. H. Wymeersch, “Iterative Receiver Design”, Cambridge University Press, (2007)
8. B. Sklar “Digital Communications” 2nd ed., , Prentice -Hall, 2001.

11UBE705 **HIGH SPEED NETWORKS**

L	T	P	C
3	0	0	3

Course objectives:

At the end of the course, student should be able to know

- *Basics of ISDN and frame relay*
- *Standards like ATM*
- *Congestion control and QOS*
- *Basics of WDM optical networks*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Explain various types of High speed networks.
CO2: Define the basic concepts of various Protocols and their Structures.
CO3: Describing various Networking Applications.
CO4: Analyzing Quality of service and Traffic engineering.
CO 5: Demonstrate about Design consideration and Latest trends in High speed networks.

UNIT I ISDN AND FRAME RELAY (9)

Introduction to High Speed networks - Basics: OSI/ISO reference model - ISDN: Conceptual view – Standards – Transmission structure – BISDN - Frame Relay: Frame mode protocol architecture – Call control – LAPF – Congestion – Traffic rate management – Explicit congestion avoidance – Implicit congestion control.

UNIT II ASYNCHRONOUS TRANSFER MODE (9)

Asynchronous transfer mode - ATM Protocol Architecture, ATM logical Connection, ATM Cell - ATM Service Categories – AAL - Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work, Traffic Control – ABR traffic Management - ABR rate control, RM cell formats, ABR Capacity allocations - GFR traffic management.

UNIT III CONGESTION CONTROL AND QOS IN IP NETWORKS (9)

Congestion Control in Packet Switching Networks: – The Need for Flow and Error Control – Link Control Mechanisms – ARQ Performance – TCP Flow Control – TCP Congestion Control – Performance of TCP Over ATM – Integrated Services Architecture – Queuing Discipline – Random Early Detection –Differentiated Services – Resource Reservation : RSVP – Multi protocol Label Switching – Real Time Transport Protocol.

UNIT IV WDM OPTICAL NETWORKS (9)

Introduction to Optical Networks – Wavelength Division Multiplexing (WDM) – Introduction to broadcast and select networks – switch architectures – channel accessing – Wavelength routed networks – switch architectures – Routing and wavelength assignment – Virtual topology design – IP over ATM over WDM – IP over WDM.

UNIT V SONET AND SDH (9)

High Speed LAN's: Fast Ethernet – Switched fast Ethernet – Gigabit Ethernet – FDDI: Network configuration – Physical Interface – Frame transmission and reception – SONET: Introduction – Layers – Frames – STS multiplexing – SONET networks – Virtual tributaries - Payload mappings – Packet over SONET – Generic Framing Procedure – Transport services – SONET over WDM – Traffic Grooming.

TOTAL HOURS=45

REFERENCE BOOKS:

1. William Stallings, “ISDN and Broadband ISDN with Frame Relay and ATM”, Prentice-Hall of India,
Fourth edition, 2004.
2. William Stallings, “High Speed Networks and Internets”, Pearson Education, Second edition, 2002.
3. C. Siva Ram Murthy and Mohan Gurusamy, “WDM Optical Networks: Concepts, Design and Algorithms”, Prentice-Hall of India, 2002.
4. Fred Halsall, “Multimedia Communications – Applications, Networks, Protocols”, Pearson Edition,
2001.

11UBE706 IC FABRICATION TECHNIQUE

L	T	P	C
3	0	0	3

Course objectives:

- *To impart sound knowledge based on IC fabrication process.*
- *To introduce the IC fabrication constraints on layout.*
- *To introduce the IC testing and yield analysis.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Impart the knowledge on IC fabrication process.
CO 2: Introduce the IC fabrication constraints on layout.
CO 3: Introduce the IC testing and yield analysis.

UNIT I INTRODUCTION (9)

The IC fabrication general process flow diagram. Process modules. Features of IC fabrication process. Modern clean rooms. Limitations of fabrication technique.

UNIT II IC FABRICATION PROCESS (9)

Simplified CMOS IC process flow and fabrication steps. Lithography as a basic method of fabrication process. Comparative analysis of lithographic methods. Resolution and accuracy. Photolithograpy. Typical operations. Photo mask and fabrication methods. Advanced lithography. Technological equipment.

UNIT III INTEGRATED CIRCUITS PACKAGING (9)

The role of IC package. Packages classification and materials. Packaging methods and technology. Thermal considerations in packaging. Interconnect levels (wire bonding, TAB process, and flip-chip technique). High –performance packages.

UNIT IV FABRICATION CONSTRAINTS ON LAYOUT (9)

Common deign rules. Scalable and micron design rules. Resolution constraints and Alignment / overlap constraints. Design rules the interface between designer and process engineer.

UNIT V IC TESTING AND YIELD ANALYSIS (9)

Measurements and control for IC characterization. Accelerated tests. Defects and yield analysis of chips. Reliability and degradation of IC. The feature of statistical process control for IC fabrication. Role of models in microelectronic technology.

TOTAL HOURS=45

REFERENCES

1. P. Girffin, Silicon VLSI Technology: Fundamentals, Practice, and Modeling, McGraw-Hill, New
York, 1998.
2. S. Wolf Silicon Processing for the VLSI ERA, vol.2: Process Integration. Lattice Press. California, 1990.
3. S. Wolf Silicon Processing for the VLSI ERA, vol.1: The Submicron MOSFET. Lattice Press. California, 1995.
4. S. Sze. VLSI Technology, McGraw-Hill, New York, 1988.
5. S. Wolf. Silicon Processing for the VLSI ERA, Vol.1: Process Technology. Lattice Press. California 1986.

11UBE707 SOLID STATE ELECTRONIC DEVICES

L	T	P	C
3	0	0	3

Course objectives:

- *To learn crystal structures of elements used for fabrication of semiconductor devices.*
- *To understand fermi levels, movement of charge carriers, Diffusion current and Drift current.*
- *To study Fabrication of different semiconductor device*
- *To learn photoelectric effect and fabrication of opto electronic devices.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Learn crystal structures of elements used for fabrication of semiconductor devices.
CO 2: Understand fermi levels, movement of charge carriers, Diffusion current and Drift current.
CO 3:Study Fabrication of different semiconductor device
CO 4: Learn photoelectric effect and fabrication of opto electronic devices

UNIT I CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS (9)

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

UNIT II ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTOR (9)

Bonding Forces and Energy bands in Solids-Bonding Forces in Solids-Energy Bands-Metals, Semiconductors, and Insulators–Direct and Indirect Semiconductors–Variation of Energy Bands with Alloy Composition-Charge Carriers in Semiconductors-Electrons and Holes-Effective Mass-Intrinsic Material-Extrinsic Material–Electrons and Holes in Quantum Wells-Carrier Concentrations-Fermi Level-Electron and Hole Concentrations at Equilibrium-Temperature Dependence of Carrier Concentrations-Compensation and Space Charge Neutrality-Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility-Drift and Resistance–Effects of Temperature and Doping on Mobility-High–Field effects-Hall Effect -invariance of the Fermi level at equilibrium-Excess Carrier in Semiconductors-Optical Absorption-Luminescence-Photoluminescence-Electro luminescence-Carrier Lifetime and Photoconductivity–Direct Recombination of Electrons and Holes–Indirect Recombination;Trapping–Steady State Carrier Generation ;Quasi-Fermi Levels-Photoconductive Devices-Diffusion of Carriers-Diffusion of Processes-Diffusion and Drift of Carrier;Built-in Fields-Diffusion and Recombination; continuity Equation –Steady state Carrier Injection; Diffusion Length-The Haynes- Shockley Experiment –Gradients in the Quasi-Fermi levels.

UNIT III JUNCTIONS (9)

Fabrication of P-N Junctions-Thermal Oxidation-Diffusion –Rapid Thermal Processing-Ion Implantation-Chemical Vapor Deposition Photolithography-Etching –Metallization-Equilibrium Conditions-The Contact Potential-Equilibrium Fermi Levels –Space Charge at a Junction-Forward –and Reverse –Biased Junctions; -Steady state conditions-Qualitative Description Of

current flow at a junction-Carrier Injection-Reverse Bias-Reverse –Bias Breakdown-Zener Breakdown –Avalanche Breakdown-Rectifiers-The Breakdown Diode-Transient and AC Conditions –Time variation of stored charge-Reverse Recovery Transient –Switching Diodes – Capacitance of P-N Junctions-The Varactor Diode-Deviations from the Simple Theory-Effects of contact Potential on carrier injection-Recombination and Generation in the Transition Region-Ohmic Losses –Graded Junctions-Metal –Semiconductor Junctions-Schottky Barriers-Rectifying contacts-Ohmic Contacts-Typical Schottky Barriers-Heterojunctions

UNIT IV THE METAL –SEMICONDUCTOR-FET (9)

The GaAS MESFET-The High Electron Mobility Transistor –Short channel Effects-The Metal Insulator Semiconductor FET-Basic Operation and Fabrication –THE ideal MOS Capacitor-Effects of Real Surfaces-Threshold Voltage –MOS capacitance Measurements- current –Voltage Characteristics of MOS Gate Oxides -The MOS Field –Effect Transistor –Output characteristics-Transfer characteristics- Mobility Models-Short channel MOSFET I-V characteristics –Control of Threshold Voltage –Substrate Bias Effects-Sub threshold characteristics –Equivalent Circuit for the MOSFET-MOSFET Scaling and Hot Electron Effects-Drain –Induced Barrier Lowering –short channel and Narrow Width Effect-Gate –Induced Drain Leakage-BJT Fabrication – Minority carrier distribution and Terminal currents-Solution of the Diffusion Equation in the Base Region-Evaluation of the Terminal currents –Current Transfer Ratio-Generalized Biasing – The coupled –Diode Model-Charge control analysis-Switching –cut off –saturation-The switching cycle-Specifications for switching Transistors-other Important Effects-Drift in the base Narrowing –Avalanche Breakdown –Injection level; Thermal Effects-Base Resistance and Emitter Crowding – Gummel –Poon Model-Kirk Effect-Frequency Limitations of Transistors-Capacitance and Charging Times-Transit Time Effects-Webster Effect-High –Frequency Transistors - Heterojunction Bipolar Transistors.

UNIT V OPTOELCTRONIC DEVICES (9)

Photodiodes-Current and Voltage in illuminated Junction-Solar Cells-Photo detectors-Noise and Bandwidth of Photo detectors-Light-Emitting Diodes-Light Emitting Materials-Fiber Optic Communications Multilayer Heterojunctions for LEDs-Lasers-Semiconductor lasers-Population Inversion at a Junction Emission Spectra for p-n junction-The Basic Semiconductor lasers-Materials for Semiconductor lasers-Integrated Circuits–Background–Advantages of Integration – Types of Integrated circuits-Monolithic and Hybrid Circuits-Evolution of Integrated Circuits-Monolithic Device Elements CMOS Process Integration–Silicon–on– Insulator (SOI)-Integration of other Circuit Elements–Charge Transfer Devices–Dynamic Effects in MOS capacitors–basic CCD-Improvements on the Basic Structure–Applications of CCDs-Ultra Large –Scale Integration (ULSI)–Logic devices–Semiconductor Memories-Testing, bonding , and Packaging - Testing –Wire Bonding –Flip-flop Techniques-Packaging

TOTAL HOURS= 45

REFERENCES

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

2. Yannis Tsividis" Operation & Mode line of The MOS Transistor" ,2nd Edition, Oxford University Press, 1999

11UBE708 NANO ELECTRONICS

L	T	P	C
3	0	0	3

Course Objectives :

- *Course gives the idea of advancements in concepts of Nanotechnology.*
- *Course will provide more industrial exposure and interest towards the application development.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Study the advancements in the area of Nanotechnology.

CO 2: Know about nano materials and their characteristics

UNIT I INORGANIC SEMICONDUCTORS (9)

Atomic bonding (ionic and covalent), bonding in solids, metals, semiconductors and insulators. Periodicity and crystal structures. Structural Properties: Theory of Elasticity. Atoms in Motion: lattice waves and phonons. Electronic Properties: Band Structure of crystalline solids. Band structures of real semiconductors and their hetero-structures. Magnetism in semiconductors: prospects for spintronics.

UNIT II ORGANIC ELECTRONICS (9)

Crystals vs. glasses; chemistry of carbon: hybrid orbitals, the benzene ring, conjugated molecules, examples of organic semiconductors; excitations in organic semiconductors: polarons and excitons, light emission from organic molecules, controlling the band gap, excitonic energy transfer; charge carrier injection and transport: mobility, spacecharges, traps; polymers vs. small molecules: The band gap in conjugated polymers, polymer solubility; organic "metals", Thermally activated processes in organic semiconductors: Holstein and Bässler models of hopping-type charge carrier transport. Radical ions, polarons and bipolarons.Polaron binding energy. Alternative charge carrier transport models: effect of traps, bi polaron generation, variable range hopping. Physics of organic devices: photovoltaic cells, light emitting diodes, thin film transistors.

UNIT III PROCESSING AND DEVICES (9)

Preparation of semiconductor solutions: chemical and physical properties of solvents – safety and environmental pollution concerns. Modification of substrate surfaces: self-assembled mono layers (SAMs), low-k and high-k polymer coatings, nano-composite polymer systems. Semiconductor film thickness and nano-structure control: choice of solvents, solution concentration vs. deposition speed, thermal treatments. Solution-based deposition techniques: spin-coating, drop-casting, deepcoating, Langmuir-Blodgett technique. Large area printing methods: screen printing, offset printing, stamping, gravure, flexography, ink-jet printing. Other non-lithographic dry and solution-based techniques: electroplating, electro polymerization, selective de-wetting, laser-assisted dry-printing. Large area, low cost and high throughput manufacturing methods for flexible
electronics (reel-to-reel process).

UNIT IV NANO ELECTRONIC STRUCTURES AND NOVEL DEVICES (9)

Ballistic electron transport, 1D transport and Büttiker-Landauer formula, quantum point contact/quantized conductance, solid-state electron optics, breakdown of Ohm's law, quantum Hall effect and 1D edge states, effect of high surface/bulk ratio on thermal dynamics; Limitations of conventional microelectronics, single-electron transistor and memory, quantized electron

current, novel ballistic electron rectifier, planar THz nano-diode and transistor, quantum-dot based memory devices.

UNIT V ULTRA HIGH SPEED NANO ELECTRONICS DEVICES (9)

CMOS scaling, challenges and limits, static power, device variability, interconnect; ITRS; Bulk CMOS improvements: strained Si, high-K dielectrics, metal gates, SOI; Novel device architectures. Compound Semiconductors Ultra High speed electronic devices and circuits: FET, HEMT, pHEMT and HBTs. Circuits: pHEMT and HBT equivalent circuits, frequency dispersion, short channel effects. GaAs andInP Integrated Circuits; Monolithic Microwave Integrated Circuits (MMIC); High Speed Analogue Design; Differential Amplifiers, cascode techniques, Direct Coupled Amplifiers; High Speed Operational Amplifiers and Analogue to Digital Converters (ADC); Low Noise Amplifiers;Transferred electronic devices: Gunn devices.

TOTAL HOURS=45

REFERENCES

1) W.R. Fahrner,"Nanotechnology and Nanoelectronics: Materials, Devices, Measurement Techniques" Springer, 2005
2) http://en.wikipedia.org/wiki/Nanoelectronics
3) George W. Hanson, "Fundamentals of nanoelectronics", Pearson Education, 2009
4)Anatoli Korkin, Federico Rosei , "Nanoelectronics and photonics: from atoms to materials, devices and architectures", Springer, 2008.

11UBE709 VIRTUAL INSTRUMENTATION

L	T	P	C
3	0	0	3

Course objectives

- *To study the various techniques of interfacing of external instruments with PC*
- *To study the various graphical programming environment in virtual instrumentation*
- *To become competent in data acquisition and instrument control*
- *To create a portfolio-quality virtual instrument system*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Describe the fundamental concepts of virtual instrumentation
CO2: Describe about the overview of graphical programming and interfacing.
CO3: Develop the system using VI programming structure.
CO4: Describe the concept of installing and configuring the Hardware.
CO 5: Apply analysis tools and implement simple applications in VI.

UNIT I FUNDAMENTALS OF VIRTUAL INSTRUMENTATION (9)

Historical perspective-Block diagram- Architecture of a virtual instrument- Concept of virtual instrumentation -PC based data acquisition -Typical on board DAQ card -Resolution and sampling frequency - Multiplexing of analog inputs - Sampling of multi-channel analog inputs- Universal DAQ card- Dataflow techniques.

UNIT II CLUSTER OF INSTRUMENTS IN VI SYSTEM (9)

Interfacing of external instruments to a PC -RS232, RS 422, RS 485 and USB standards - IEEE 488 standard -ISO-OSI model for serial bus -Introduction to bus protocols of MOD bus and CAN bus-Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. Bus Interfaces: USB, PCMCIA, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI. Networking basics for office & Industrial applications, VISA and IVI.

UNIT I II VI GRAPHICAL PROGRAMMING TECHNIQUES (9)

Concepts of graphical programming-Labview software -Concept of VIs and sub VI- Display types -Digital & Analog Chart -Oscilloscopic types -Loops -Case and sequence structures- Types of data -Arrays -Formulae nodes -Local and global variables -String and file I/O-Comparison with conventional programming-Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming.

UNIT IV ANALYSIS TOOLS (9)

Fourier transform - Power spectrum - Correlation- Windowing and filtering tools -Simple temperature indicator -ON/OFF controller- PID controller - CRO emulation - Simulation of a simple second order system -Generation of HTML page.

UNITV APPLICATIONS (9)

Virtual Instrumentation applications-System building and simulation on VI-Instrument Control-Development of process database management system, Simulation using VI-Modulation techniques: TDM, FDM, ASK, PSK-Distortion analyzer, Logic analyzers- Development of Control system, Industrial Communication, Image acquisition and processing ,Motion control.

TOTAL HOURS=45

REFERENCES

1. Gary W. Johnson, Richard Jennings, 'Lab-view Graphical Programming', McGraw Hill Professional Publishing, 2001.
2. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall, New Jersey,1997.
3. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.
4. S. Gupta and J.P Gupta, 'PC Interfacing for Data Acquisition and Process Control', Instrument society of America, 1994.
5. Peter W. Gofton, 'Understanding Serial Communications', Sybex International, Prentice Hall, 2003
6. Robert H. Bishop, 'Learning with Lab-view', Prentice Hall, 2003.
www.ltrpub.com / www.ni.com / www.andrews.edu/~degroot/

11UBE710 ELECTROMAGNETIC I NTERFERENCE AND COMPATIBILITY

L	T	P	C
3	0	0	3

Course objectives

To understand different electromagnetic Interference problems occurring in systems and their possible mitigation techniques in Electronic design

• To understand EMI Sources, EMI problems and their solution methods in PCB leve / subsystem and system level design.

• To measure the emission. immunity level from different systems to couple with the prescribed EMC standards

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe the various aspects of EMI/EMC and EMI properties of various passive components.
CO 2: Develop the knowledge on various EMI control Techniques.
CO 3: Apply the various Noise and radiation concepts in design of RF circuits.
CO 4: Describe the concepts of EMI Measurements and standards.

UNIT I BASIC CONCEPTS (9)

Definition of EMI and EMC with examples, Classification of EMI/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT II EMI MEASUREMENTS (9)

Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments-Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection technique open area site, shielded anechoic chamber, TEM cell.

UNIT III EMC STANDARD AND REGULATIONS (9)

National and Intentional standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENEEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

UNIT IV EMI CONTROL METHODS (9)

Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT V EMC DESIGN AND INTERCONNECTION TECHNIQUES (9)

Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding

TOTAL HOURS= 45

TEXT BOOKS

1. Prasad Kodali.V ," Engineering Electromagnetic Compatibility" S.Chand&Co , New Delhi 2000
2. Clayton R.Paul," Introduction to Electromagnetic compatibility " John Wiley & Sons,1992

REFERENCES

1. Keiser," Principles of Electromagnetic Compatibility", Artech House, 3rd Edition ,1994
2. Donwhite Consultant Incorporate – Handbook of EMI / EMC – Vol I - 1985
3. Nandita Das Gupta &Aamitava Das Gupta- Semiconductor Devices Modeling a Technology, PHI, 2004

11UBE801 MICROWAVE INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

Course objectives:

- *To impart sound knowledge about the basics of microwave integrated circuits.*
- *To introduce the fundamentals of passive components, amplifiers.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1:Impart sound knowledge about the basics of microwave integrated circuits.
CO 2: Introduce the fundamentals of passive components, amplifiers.
CO 3: Develop the knowledge on various oscillators.
CO 4: Describe about Integrated Antennas And Various Measurement Techniques.

UNIT I INTRODUCTION TO MICROWAVE INTEGRATED CIRCUITS (9)

MMIC- technology, advantages and applications, Active device technologies, design approaches, multichip module technology, substrates.

UNIT II PASSIVE COMPONENTS (9)

Inductors, capacitors, resistors, microstrip components, coplanar circuits, multilayer techniques, micro machined passive components, switches & attenuators, filter design.

UNIT III AMPLIFIERS (9)

Stability & gain analysis, matching techniques, reactively matched amplifier design, LNA.

UNIT IV OSCILLATORS (9)

Design principles, active device CAD techniques for large signal oscillators design, phase noise, MMIC_VCO, mixers.

UNIT V INTEGRATED ANTENNAS AND MEASUREMENT TECHNIQUES (9)

Integrates antenna selection, photonic band gap antennas, micro machined antenna, micro electro mechanical system antennas, test fixture measurements, probe station measurements , thermal and cryogenic measurements, experimental field probing techniques.

TOTAL HOURS=45

REFERENCE BOOKS

1. Ravender Goyal, “Monolithic MIC; Technology & Design”, Artech House, 1989.
2. Gupta K.C. and Amarjit Singh, “ Microwave Integrated Circuits”, John Wiley, NewYork, 1975.
3. Hoffman R.K. “Handbook of Microwave Integrated Circuits”, Artech House, Boston,1987.
4. Ulrich L. Rohde and David P.N., “ RF / Microwave Circuit Design for Wireless Applications”, John Wiley, 2000.
5. C. Gentili, “ Microwave Amplifiers and Oscillators”, North Oxford Academic, 1986.
6. Annapurna Das and Sisir K Das, “ Microwave Engineering”, Tata McGraw-Hill Pub. Co. Ltd., 2004.
7. Samuel. Y. Liao, “ Microwave Circuit Analysis and Amplifier Design”, Prentice Hall.Inc., 1987.
8. Mathew N.O. Sadiku, “Numerical techniques in Electromagnetics”, CRC Press, 2001.

11UBE802 OPTO ELECTRONICS AND OPTICAL NETWORKS

L	T	P	C
3	0	0	3

Course objectives:

To understand

- *The basics of solid state physics.*
- *Nature and characteristics of light, different methods of luminescence, emission and absorption - display devices laser types.*
- *Their applications, optical transmission and receiption and Optical Networks.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Understand the basics of solid state physics.

CO 2: Study about Nature and characteristics of light, different methods of luminescence, emission and absorption - display devices laser types.

CO 3: Learn about optical transmission and reception characteristics and Various Optical Networks and their applications.

UNIT I FUNDAMENTALS OF LIGHT AND SOLID STATE PHYSCIS (9)

Electro-magnetic wave, Wave nature of light - Light Source - Emission and absorption of light: Electronic emission (thermo-electronic, auto-electronic, secondary, photo-electronic and exo-electronic), Spontaneous and Stimulated emission of light, Interference, Diffraction- Absorption -self or fundamental absorption, component absorption, absorption through free electricity carriers, crystal grid absorption, exitonic absorption and plasma absorption) - Polarisation and material dispersion –acceptor-donor, photo-effect - Liquid crystals: properties and application

UNIT II OPTO ELECTRONICS DEVICES AND SYSTEMS (9)

Optical wave-lines definition, types, spreading of waves in wave-lines, wave-lines with circle shaped cross section -Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Avalanche Photodiodes, , Phototransistors - — Noise mechanism – Signal to noise analysis Detector Performance Optical Systems considerations Principles of photodetection and photodetectors p-i-n diode - Frequency response of p-i-n diodes- etectors – PIN- PINFET diodes- Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices - Waveguides and optical fibers- Optical resonators- wavelength-division-multiplexing- Solar cell and other optical devices.

UNIT III OPTICAL TRANSMITTER AND RECEIVERS (9)

OPTICAL TRANSMISSIONS DEVICES : Modulation of optical signals - Lasers : Principles of laser action - Stimulated Emission and Optical Gain - Population Inversion and Optical Feedback - Threshold Current and Output Characteristics- Light modulation and coupled in optical fiber - Semiconductor lasers - Laser Modes and its applications- Electro-optic modulators, Optical amplifiers - Optical modulators and swithches.

OPTICAL RECECPTION DEVICES : Waveguides Optical radiation sources LED - D and Avalanche detector - Avalanche photo- diodes, sensitivity of real optical receivers

UNIT IV OPTICAL FIBER AND OPTOELECTRONIC INTEGRATED CIRCUITS (9)

Definition - Principles of optical fiber - Types, Optical fiber fabrication and consideration Test equipment and measurement techniques. optical fibers with step refraction of light, optical fibers with gradient index of refraction, Dispersion coefficient, Inter-mode dispersion, Material dispersion, wave-line dispersion - Group latency and dispersion in optical fibers with step refraction index - basic properties of modes in optical fibers, manufacture technologies for optical fibers

UNIT V OPTICAL NETWORKS (9)

An overview of the opticla Network labyer and optical layer - Boundaries of the optical netwrok layer - Evolution and generation of optical network – Internetworking with domain – MAN – Optical networkign techniques and components – WDM mesh networks – management of the optical network layer - optical network standards- Opto-electronic networks: FDDI, Fiber channel, SONET, SDH, Ethernet on optical networks. Basic principles of wavelength division multiplexing (WDM), including dense wavelength division multiplexing (DWDM), and corresponding architectures. Components required for WDM networks. International standards for WDM networks.

TOTAL HOURS=45

REFERENCES

1. J .Wilson and J.Haukes, “Opto Electronics – An Introduction”, Prentice Hall of India Pvt Ltd, New Delhi, 1995
2. P Bhattacharya “Semiconductor Opto Electronic Devices”, Prentice Hall of India Pvt, Ltd, New Delhi, 1995
3. Joachim Piprek ,”Optoelectronic devices Advanced Simulation and Analysis” Springer,2005
4. Jasprit Singh, “Opto Electronics – As Introduction to materials and devices”, McGraw-Hill International Edition, 1998

11UBE803 MOBILE AD-HOC NETWORKS

L	T	P	C
3	0	0	3

Course objectives:

At the end of the course, student should be able to know

- *Basics mobile ad-hoc Networks*
- *Standards and Technologies for mobile ad-hoc Networks*
- *Design Level of mobile ad-hoc Networks*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Analyse various Basic Routing Algorithm of mobile ad-hoc Networks

CO 2: Design the various layers of mobile ad-hoc Networks

CO 3: Study about different sensor network algorthims

CO4: To Introduce advance wireless networks and testing platforms

UNIT I AD HOC NETWORKS (9)

Characteristics and Applications of Ad hoc Networks - Routing – Need for routing and routing classifications - Table Driven Routing Protocols - Source Initiated On-Demand Routing Protocols -Hybrid Protocols – Zone Routing - Fisheye Routing - LANMAR for MANET with group mobility - Location Added Routing, Distance Routing Effects - Micro discovery and Power Aware Routing.

UNIT II DESIGN OF ADHOC NETWORKS (9)

Mobility Management, modeling distributed applications for MANET, MAC mechanisms and protocols Ad hoc network security – Link layer, Network layer, Trust and key management. Self policing MANET – Node Misbehavior, secure routing, reputation systems , Wireless Sensor Networks (WSN) – Design Issues, Clustering, Applications of WSN.

UNIT III SENSOR NETWORKS (9)

Wireless Sensor Networks - DARPA Efforts –Classification - Fundamentals of MAC - Flat routing – Directed Diffusion-SPIN - COGUR - Hierarchical Routing - Cluster base routing – Scalable Coordination – LEACH – TEEN - APTEEN and Adapting to the dynamic nature of

UNIT IV MANAGING WIRELESS NETWORKS AND TESTING (9)

Managing Wireless Broadband Operations Management of LMDS Systems and their Application - Principles of operations Management - LMDS Versus Other Access technologies – Applications -Testing Wireless Satellite Networks and Fixed Wireless Broadband Networks.

UNIT V ADVANCED WIRELESS NETWORKS (9)

Wireless. Broadband Network Applications – Teleservices Model and Adaptive QoS Parameters – Modeling of Wireless – Broadband Applications – Multicomponent Model – Residential High speed Internet Wireless Broadband Satellite Systems – Next Generation Wireless Broadband Networks – 3G, Harmonized 3G, 3G CDMA, Smart Phones and 3G Evolution.

TOTAL HOURS=45

REFERENCES

1. C. Siva Ram Murthy & B.S. Manoj, “Mobile Ad hoc Networks – Architectures & Protocols”, Pearson Education, New Delhi, 2004

2. Aggelou -“Mobile Ad-hoc Networks” –, George (McGraw-Hill).

3. John R. Vacca, “Wireless Broadband Networks Handbook 3G, LMDS and Wireless Internet”, Tata McGraw-Hill, 200

4. Agrawal D.P., and Qing-An zeng,” Introduction to Wireless and Mobile Systems” Thomson Learning, 2003

5. Martyn Mallick, “Mobile and Wireless Design Essentials”, Wiley, 2003.

11UBE804 WIRELESS SENSOR NETWORKS

L	T	P	C
3	0	0	3

Course objectives:

At the end of the course, student should be able to know

- *Basics of Wireless Sensor Networks*
- *Standards and Technologies for Wireless Sensor Networks*
- *Design Level of Sensor Nodes and Wireless Sensor Networks*
- *Sensor Network Platforms*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Know the Basics of Wireless Sensor Networks

CO 2: Study the Factors involved in design of Wireless Sensor Network architecture

CO 3: Analyse various communication protocols and algorithms involved in the design of Wireless Sensor Networks

CO 4: Introduce various Sensor Network Platforms and tools

UNIT I INTRODUCTION TO WIRELESS SENSOR NETWORKS (9)

Introduction–Background of Wireless Sensor Network Technology-Deployment and Evaluation –Sensor Network Standards-RF Technologies for WSN-Operating Systems and Execution Environments-Examples of Sensor Nodes-Challenges for wireless Sensor Networks– Applications

UNITII WIRELESS SENSOR NETWORK DESIGN AND NETWORK ARCHITECTURE (9)

Factors influencing WSN Design–WSN Topology–Transmission Media– Power Consumption - Design Principles of WSN – Architecture – Single Node Architecture - Hardware Components- Energy consumption of Sensor Networks- Protocol Stack – Sensor Network Scenarios – Optimization goals and figure of merits – Service Interfaces of WSN – Gateway Concepts

UNIT III COMMUNICATION PROTOCOLS (9)

Physical Layer – Physical Layer and Transceiver design consideration in WSN – MAC Protocol- Fundamentals of MAC Protocol – Low duty cycle protocols and wakeup concepts – Contention based and schedule based MAC – IEEE 802.15.4 MAC Protocol – Routing for WSNs – Routing challenges and Design Issues - Energy Efficient Unicast , Broadcast and Multicast – Geographic Routing – Mobile Nodes

UNIT IV ENERGY EFFICIENCY AND POWER CONTROL (9)

Introduction–Need for Energy Efficiency and Power Control–Energy aware operations–Energy Harvesting–Power Consumption in Sensor Nodes–Power Control at different protocol Layers – Physical Layer Power Conservation Mechanisms–Higher Layer Power Conservation Mechanisms

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS (9)

Sensor Mote Platforms - Sensor Node Hardware – Hardware Platforms for WSNs: Mica2,MicaZ,TelosB,Tmote,Btnode, and Sun SPOT — WSN Simulation Platform- Node Level Simulation Platform – Node Level Simulators : NS2, TOSSIM -Middleware Architecture for WSN – Open Issues in software Technologies

TOTAL HOURS=45

REFERENCES:

1. Edger H.Callaway Jr., “Wireless Sensor Networks: Architecture and Protocols”,Auerbach Publications.2004
2. Fang Zhao and Leonidas Guibas, “Wireless Sensor Networks: An Information Processing Approach”, Morgan Kaufman Publishers,2004.
3. Ian F.Akyildiz , Mehmet Can Vuran “Wireless Sensor Networks”, John Wiley and Sons Publications, New Jersey ,First Edition2010
4. C.S.Raghavendra “ Wireless Sensor Networks” John Wiley and SonsPublications, 2005
5. Kazem Sohraby, Daniel Minoli, Taieb F. Znati “Wireless sensor networks: Technology, protocols, and applications, John Wiley and Sons Publications, 2007
6. Jun Zheng, Abbas Jamalipour “Wireless Sensor Networks – A Networking Perspective” John Wiley and Sons Publications, New Jersey,2009
7. Ana –Belen Garcia – Hernando, Jose Fernan Martinez “Problem Solving for Wireless Sensor Networks” – Springer Publication ,2008
8. University of Manitoba , Canada - http://umanitoba.ca
9. University of Southampton, UK - http://www.soton.ac.uk/

11UBE805 ADVANCED RADIATION SYSTEMS

L	T	P	C
3	0	0	3

Course objectives:

- *To impart sound knowledge about the fundamental concepts of antenna.*
- *To introduce the concepts of radiation of array antenna.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1:Impart sound knowledge about the fundamental concepts of antenna.
CO 2: Introduce the concepts of radiation
CO 3: To learn about the antenna arrays and microstrip antenna design
CO 4: Analyse antenna measurement techniques and parameters

UNIT I ANTENNA FUNDAMENTALS (9)

Antenna fundamental parameters, Radiation integrals, Radiation from surface and line current distributions– dipole, monopole, loop antenna; Mobile phone antenna-base station, hand set antenna; Image; Induction ,reciprocity theorem, Broadband antennas and matching techniques, Balance to unbalance transformer, Introduction to numerical techniques

UNIT II RADIATION FROM APERTURES (9)

Field equivalence principle, Radiation from Rectangular and Circular apertures, Uniform aperture distribution on an infinite ground plane; Slot antenna; Horn antenna; Reflector antenna, aperture blockage, and design consideration.

UNIT III ARRAY ANTENNA (9)

Linear array –uniform array, end fire and broad side array, gain, beam width, side lobe level; Two dimensional uniform array; Phased array, beam scanning, grating lobe, feed network; linear array synthesis techniques – Binomial and Chebyshev distributions.

UNIT IV MICRO STRIP ANTENNA (9)

Radiation Mechanism from patch; Excitation techniques; Microstrip dipole; Rectangular patch, Circular patch, and Ring antenna – radiation analysis from cavity model; input impedance of rectangular and circular patch antenna; Microstrip array and feed network; Application of microstrip array antenna.

UNIT V EMC ANTENNA AND ANTENNA MEASUREMENTS (9)

Concept of EMC measuring antenna; Rx and Tx antenna factors; Log periodic dipole, Biconical, Ridge guide, Multi turn loop; Antenna measurement and instrumentation – Gain,Impedance and antenna factor measurement; Antenna test range Design.

TOTAL HOURS=45

REFERENCES:

1. Balanis.A, “Antenna Theory Analysis and Design”, John Wiley and Sons, NewYork, 1982.
2. Krauss.J.D, “Antennas”, II edition, John Wiley and sons, New York, 1997.
3. I.J. Bahl and P. Bhartia,” Microstrip Antennas”,Artech House,Inc.,1980
4. W.L.Stutzman and G.A.Thiele,”Antenna Theory and Design”, 2nd edition,John Wiley&Sons Inc.,1998.

11UBE806 RADAR AND NAVIGATIONAL AIDS

L	T	P	C
3	0	0	3

Course objectives:

- *To derive and discuss the Range equation and the nature of detection.*
- *To apply doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars*
- *To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.*
- *To understand principles of navigation, in addition to approach and landing aids as related to navigation*
- *To understand navigation of ships from shore to shore.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Acquire the Fundamentals of Radar.
CO 2: Describe about different types of Radar and their working.
CO 3: Understand the function of RADAR transmitter and Receiver.
CO 4: Gain skills in RADAR signal Detection techniques
CO 5: Analyze the different Radar Navigation techniques.

UNIT I RADAR EQUATIONS (9)

RADAR Block Diagram & operation- RADAR Frequencies- RADAR Equation- Detection of signals in Noise-RADAR cross section of targets- RADAR cross section fluctuations- transmitter power- pulse repetition frequency- system losses and propagation effects.

UNIT II MTI AND PULSE DOPPLER RADAR (9)

Introduction to Doppler & MTI RADAR- Delay Line canceller- Moving Target Detector- Pulse Doppler RADAR- Non-Coherent MTE- CW RADAR- FMCW RADAR- Tracking RADAR- Monopulse Tracking –Conical Scan and Sequential Lobing.

UNIT III RADAR SIGNAL DETECTION AND PROPAGATION ON WAVES (9)

Detection criteria- automatic detection- constant false alarm rate receiver- information available from a RADAR- ambiguity diagram- pulse compression- introduction to clutter- surface clutter RADAR equation- anomalous propagation and diffraction.

UNIT IV RADIO NAVIGATION (9)

Adcock directional finder- automatic directional finder- hyperbolic Systems of Navigation- Loren and DeccaNavigation System- Tactical Air Navigation.

UNIT V RADAR TRANSMITTER AND RECEIVER (9)

Linear beam power tubes- Solid state RF power sources- solid state devices used in RADAR- Magnetron- crossed field amplifiers- other aspects of radar transmitter- RADAR Receiver- Receiver noise figure- superheterodyne receiver- dynamic range- RADAR Displays.

TOTAL HOURS=45

REFERENCES

1. M.I. Skolnik, “Introduction to RADAR systems”, 3rd edition, mcgraw Hill.
2. N.S. Nagaraja “Elements of Electronic Navigation”, Tata mcgraw Hill, 1993.
3. Nadav Levanon, “RADAR Principles*”,* John Wiley and Sons, 1989.
4. Brookner, “ RADAR Technology*”,* Artech Hons, 1986

11UBE807 OPTO ELECTRONIC DEVICES

L	T	P	C
3	0	0	3

Course objectives:

- *To know the basics of solid state physics and understand the nature and characteristics of light.*
- *To understand different methods of luminescence, display devices and laser types and their applications.*
- *To learn the principle of optical detection mechanism in different detection devices.*
- *To understand different light modulation techniques and the concepts and applications of optical switching.*
- *To study the integration process and application of opto electronic integrated circuits in transmitters and receivers.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Explain the basic elements of light and solid state physics.
CO2: Describe the different types of luminescence, display devices and LASERS.
CO3: Illustrate and interpret the characteristics of optical detection devices.
CO4: Describe the different kinds of optic modulators.
CO5: Understand the various optoelectronic integrated circuits.

UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS (9)

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT II DISPLAY DEVICES AND LASERS (9)

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT III OPTICAL DETECTION DEVICES (9)

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR (9)

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices.

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS (9)

Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

TOTAL HOURS=45

REFERENCES:

1. J. Wilson and J.Haukes, “Opto Electronics – An Introduction”, Prentice Hall of India Pvt. Ltd., New Delhi, 1995.
2. Bhattacharya “Semiconductor Opto Electronic Devices”, Prentice Hall of India Pvt., Ltd., New Delhi, 1995.
3. Jasprit Singh, “Opto Electronics–As Introduction to materials and devices”, McGraw-Hill International Edition, 1998.

11UBE808 **VISUAL CRYPTOGRAPHY**

L	T	P	C
3	0	0	3

Course objectives :

- *Course gives the idea of Advancement in Network and security systems, concepts.*
- *Course Will enhance the research are of field and development of new technology*
- *Course will provide more industrial exposure and interest towards the application development.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO1: Describe network security concepts and the security assessment procedures.

CO2: Summarize the basic concepts of secure communication, to test and classify cryptography algorithms.

CO3: Apply the authentication code and hash functions and describe its applications.

CO4: Discuss the implementation of security management issues and policies in IP.

CO 5: Outline about the visual cryptography technique.

UNIT I INTRODUCTION (9)

OSI Security Architecture - Classical Encryption techniques – Cipher Principles – Data Encryption Standard –Block Cipher Design Principles and Modes of Operation - Evaluation criteria for AES – AES Cipher – Triple DES –Placement of Encryption Function – Traffic Confidentiality

UNIT II PUBLIC KEY CRYPTOGRAPHY (9)

Key Management - Diffie-Hellman key Exchange – Elliptic Curve Architecture and Cryptography – Introduction to Number Theory – Confidentiality using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT III AUTHENTICATION AND HASH FUNCTION (9)

Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions –Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – RIPEMD –HMAC Digital Signatures – Authentication Protocols – Digital Signature Standard

UNIT IV NETWORK SECURITY & SYSTEM LEVEL SECURITY (9)

Authentication Applications : Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP –S/MIME - IP Security – Web Security. Intrusion detection – password management – Viruses and related Threats –Virus Counter measures – Firewall Design Principles – Trusted Systems

UNIT V VISUAL CRYTOGRAPHY (9)

Shamir's Secret Sharing scheme, Verifiable Secret Sharing, Threshold RSA, Visual Cryptography & steganography.

TOTAL HOURS=45

REFERENCES

1. Moni Naor and Adi Shamir,Visual Cryptography –Eucrocrypt '94.
2. Cryptography & Network Security, McGraw-Hill, Inc. New York, NY,2008.
3. G.Ateniensem,C.Blundo,A.de Santis and D.R.Stinson(1996), Visual Crytography for General Access structures.
4. N.Nakajima and Y.Yamaguchi(n.d.). Extended Visual Crytography for Natural Images.

11UBE809 MULTIMEDIA COMPRESSION TECHNIQUES

L	T	P	C
3	0	0	3

Course objectives:

- *To provide a depth and systematic understanding of the principles of data compression.*
- *To learn different compression methods for text, image, audio and video data.*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: understand various text, audio, image and video compression techniques in Multimedia.

CO2: Emphasis on compressing and transmitting of multimedia objects over the Web.

CO3: Introduce Lossless compression and Lossy compression schemes for images, speech and audio.

CO4: Discuss various video compression techniques in Multimedia.

UNIT I INTRODUCTION (9)

Introduction to Multimedia, Overview of different types of multimedia information, Information representation, Overview of Human audio, Visual systems, Need for Compression, Taxonomy of compression techniques, Hypertext and Hypermedia, Overview of source coding, source models, scalar quantization theory, rate distribution theory, vector quantization, Evaluation techniques-error analysis and methodologies.

UNIT II TEXT COMPRESSION (9)

Introduction , Basics of information theory, Run-length coding, Huffmann coding, Adaptive Huffmann Coding, Arithmetic coding, Shannon-Fano coding, Finite Context Modeling, Dictionary techniques –LZ77 and LZW algorithms, Entropy measures of performance, Quality measures.

UNIT III AUDIO COMPRESSION (9)

Frequency domain and filtering, basic subband coding, application to audio coding-MPEG audio, progressive encoding for audio-silence compression, speech compression techniques- ADPCM in Speech Coding, G.722, G.726, Vocoders, Other Commercial Audio Codecs, MIDI.

UNIT IV IMAGE COMPRESSION (9)

Graphics and image data representation, graphics/image data types, Color in image : color science, color models in images, Monochrome and grayscale compression, Predictive techniques – DM, PCM, DPCM – Contour based compression – Transform Coding – Sub-band coding– Wavelet based compression – EZW, quadtrees, EPIC, SPIHT coders –JPEG,JPEG 2000 standards - JBIG, JBIG2 standards, Bi-level Image Compression Standards

UNIT V VIDEO COMPRESSION (9)

Video signal representation, Types of video signals, analog video, digital video, Introduction to video compression, video compression based on motion compensation, search for motion vectors, H.261, H. 263, MPEG 1, MPEG 2, MPEG 4, MPEG 7, Packet video.

TOTAL HOURS=45

REFERENCES

1. Khalid Sayood "Introduction to Data Compression", Morgan Kauffman Harcourt India, 2nd Edition, 2000.
2. David Salomon "Data Compression – "The Complete Reference", Springer Verlag New York Inc., 2 nd Edition, 2001.
3. Mark S.Drew, Ze-Nian Li : "Fundamentals of Multimedia", PHI, 1st Edition, 2003.

4. T.M. Cover and J.A. Thomas, “Elements of Information Theory”, 2nd Edition, John Wiley and Sons, 2006,
5. Gersho and Gray, “Vector Quantization and Signal Compression”, Kluwer Academic Publishers, 1991
6. R. Steinmetz and K. Nahrstedt, Multimedia: “Computing, Communications and Applications”, Prentice-Hall Innovative Technology Series, 1996.

11UBE810 REMOTE SENSING AND GIS

L	T	P	C
3	0	0	3

Course objectives:

The students who successfully complete will have

- *depth and systematic understanding of the principles remote sensing and GIS*
- *be able toy know the remote sensing satellites, image processing in remote sensing*

COURSE OUTCOMES

Upon successful completion of the course, students shall have ability to

CO 1: Describe concepts of Remote sensing, sensors and their characteristics.

CO 2: Gain skills in image analysis and interpretation in preparing maps.

CO 3: Study about various sensing satellite and microwave remote sensing techniques

CO4: Overview about GIS and its models.

UNIT I REMOTE SENSING CONCEPTS (9)

Energy Sources and Radiation Principles – Energy Interactions in theAtmosphere, Earth Surface Features – Data Acquisition and Interpretation – Ideal Remote Sensing System– Real Remote Sensing System Characteristics – Global Positioning System – Across Track Scanning and Operating Principles – Along Track Scanning .

UNIT II IMAGE PROCESSING IN REMOTE SENSING (9)

Image Enhancement-Contrast Manipulation–Spatial Feature Manipulation–Image Classification – Supervised Classification–Classification Stage–Training Stage–Unsupervised Classification–Hybrid Classification–Post Classification Smoothing–Output Stage–Change Detection Techniques

UNIT III MICROWAVE REMOTE SENSING & REMOTE SENSING SATELLITE (9)

Active Microwave Sensing – Side-Looking Radar System Operation – Synthetic Aperture Radar – Passive Microwave Sensing – Microwave Radiometers – Passive Microwave Scanner – Applications- LIDAR Remote Sensing. Remote Sensing Satellites: IRS 1A/1B – IRS 1C/1D – IRS P4 (OCEANSAT-1) – IRS P5 (CARTOSAT-1) – IRS P6 (RESOURCE SAT-1) – CARTOSAT-2 – RISAT-1 - Landsat – SPOT Satellites.

UNIT IV GEOGRAPHICAL INFORMATION SYSTEMS (9)

Information Systems Overview – GIS Definitions and Terminology – GIS Queries – GIS Architecture – Theoretical Models of GIS. Spatial Data Modelling:Stages of GIS Data Modelling – Graphic Data Representation of Spatial Data – Raster GIS Models –Vector GIS Models – Comparison of Raster and Vector Data Models

UNIT V REMOTE SENSING APPLICATIONS (9)

Image Interpretation Elements, Strategies and Keys – Land Use/Land Cover Mapping – Agricultural Applications – Forestry Applications – Water Resource Applications – Urban & Regional Planning Applications – Wetland Mapping – Wild Life Ecology Applications – Archaeological Applications.

TOTAL HOURS=45

REFERENCES:

1. Thomas M.Lillesand, Ralph W.Kiefer, “Remote Sensing and Image Interpretation”, Fifth Edition,2004. (Units I to III & V)

2. M.Anji Reddy, “Remote Sensing and Geographical Information Systems”, Second Edition, BS Publications. 2001 (Unit IV)

3. Swain and Davis,“Remote Sensing – The quantitative Approach”, McGraw Hill ,.1997.

4. John R. Jensen, “Remote Sensing of the Environment – An Earth Resource Perspective”, PearsonEducation Series, 2003.
5. Kang-Tsung Chang, “Introduction to Geographic Information Systems”, Tata McGraw-Hill Edition,2002