B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum &Syllabus [Regulation B (2013)]

SEMESTER I

Course Code	Course Name	L	T	P	C
THEORY					
U1GEB01	Communicative English - I	3	0	0	3
U1GEB02	Engineering Mathematics - I	3	1	0	4
U1GEB03	Engineering Physics - I	3	0	0	3
U1GEB04	Engineering Chemistry - I	3	0	0	3
U1GEB05	Basic Electrical and Electronics Engineering	3	0	0	3
U1GEB06	Engineering Graphics	3	1	0	4
PRACTICAL					
U1GEB07	Engineering Physics and Chemistry Laboratory - I	0	0	4	2
U1GEB08	Basic Electrical and Electronics Laboratory	0	0	3	2
U1GEB09	Engineering Practices laboratory	0	0	3	2
Total		18	2	10	26

SEMESTER II

Course Code	Course Name	L	T	P	C
THEORY					
U2GEB10	Communicative English-II	3	0	0	3
U2GEB11	Engineering Mathematics –II	3	1	0	4
U2GEB12	Engineering Physics – II	3	0	0	3
U2GEB13	Engineering Chemistry – II	3	0	0	3
U2GEB15	Basics of Mechanical and Civil Engineering	3	0	0	3
U2GEB14	Fundamentals of Computing and Programming	3	0	0	3
PRACTICAL					
U2GEB16	Computer Practice Laboratory	0	0	3	2
U2GEB17	Engineering Physics & Chemistry Laboratory-II	0	0	4	2
U2GEB18	Communication Skills Laboratory	0	0	3	2
Total		18	1	10	25

B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING
Curriculum &Syllabus [Regulation BR (2014)]

SEMESTER I

Course Code	Course Name	L	T	P	C
THEORY					
U1GEB20	Engineering English - I	2	0	0	2
U1GEB21	Engineering Mathematics - I	3	1	0	4
U1GEB22	Engineering Physics - I	2	0	0	2
U1GEB23	Engineering Chemistry - I	2	0	0	2
U1GEB24	Principles of Electrical and Electronics Engineering	3	0	0	3
U1GEB25	Basics of Computing and C Programming	3	0	0	3
PRACTICAL					
U1GEB26	Engineering Physics and Chemistry Laboratory - I	0	0	4	2
U1GEB27	Principles of Electrical and Electronics Engineering Laboratory	0	0	3	2
U1GEB28	Computer Practices laboratory	0	0	3	2
Total		15	1	10	22

SEMESTER II

Course Code	Course Name	L	T	P	C
THEORY					
U2GEB29	Engineering English-II	2	0	0	2
U2GEB30	Engineering Mathematics –II	3	1	0	4
U2GEB31	Engineering Physics – II	2	0	0	2
U2GEB32	Engineering Chemistry – II	2	0	0	2
U2GEB33	Basics of Mechanical and Civil Engineering	3	0	0	3
U2GEB34	Engineering Graphics	3	1	0	4
PRACTICAL					
U2GEB37	Engineering Practice Lab	0	0	3	2
U2GEB35	Engineering Physics & Chemistry Laboratory-II	0	0	4	2
U2GEB36	Proficiency in English Lab - I	0	0	3	2
U2GEB38	Life Skills	1	0	0	1
Total		16	2	10	24

B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum [Regulation 2013]

SEMESTER – III

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U3MAB01	Transforms and Partial Differential Equations	3	1	0	4
U3ECB01	Semiconductor Devices and Circuits	3	1	0	4
U3ECB02	Digital System Design	3	1	0	4
U3ECB03	Control System	3	1	0	4
U3CSB01	Data Structures & Algorithms	3	0	0	3
U3CEB13	Environmental Science and Engineering	3	0	0	3
PRACTICAL					
U3ECB04	Semiconductor Devices and Circuits Lab	0	0	3	2
U3ECB05	Digital System Design Lab	0	0	3	2
U3CSB05	Data Structure Lab	0	0	3	2
Total Credits					28

L – Lecture; T – Tutorial; P – Practical; C - Credit

SEMESTER IV

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U4MAB04	Probability and Random Processes	3	1	0	4
U4ECB06	Analog Electronic Circuits	3	0	0	3
U4ECB07	Linear Integrated Circuits	3	0	0	3
U4ECB08	Electromagnetic Fields	3	1	0	4
U4ECB09	Principles of Signals and Systems	3	1	0	4
U4CSB76	Object Oriented Programming	3	0	0	3
PRACTICAL					
U4ECB10	Linear Integrated Circuits Lab	0	0	3	2
U4ECB11	Analog Circuit Design Lab	0	0	3	2
U4CSB77	Object Oriented Programming Lab	0	0	3	2
Total Credits					27

L – Lecture; T – Tutorial; P – Practical; C - Credit

SEMESTER V

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U5ECB12	Digital Signal Processing	3	1	0	4
U5ECB13	Communication Systems and Techniques	3	0	0	3
U5ECB14	Microprocessors and Microcontrollers	3	1	0	4
U5ECB15	Transmission Lines and Waveguides	3	1	0	4
U5CSB15	Data Communication and Computer Networks	3	0	0	3
U5BAB01	Total Quality management	3	0	0	3
PRACTICAL					
U5ECB16	Digital Signal Processing Lab	0	0	3	2
U5ECB17	Microprocessors and Microcontrollers Lab	0	0	3	2
U5CSB17	Networks Lab	0	0	3	2
Total Credits					27

L – Lecture; T – Tutorial; P – Practical; C - Credit

SEMESTER VI

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U6ECB18	Digital Communication Techniques	3	0	0	3
U6ECB19	Advanced Controller Architecture	3	0	0	3
U6ECB20	Antenna & Wave Propagation	3	1	0	4
U6ECB21	Mobile Communication	3	0	0	3
U6ECB44	Embedded System & RTOS	3	0	0	3
UEGEB13	Integrated Product Development	3	0	0	3
PRACTICAL					
U6ECB22	Advanced Controller Lab	0	0	3	2
U6ECB23	Communication Systems Lab	0	0	3	2
U6ENB01	Proficiency in English	0	0	3	2
Total Credits					25

L – Lecture; T – Tutorial; P – Practical; C - Credit

SEMESTER VII

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U7ECB24	VLSI Design	3	1	0	4
U7ECB25	Fiber Optic Communication	3	0	0	3
U7ECB26	Microwave Engineering	3	0	0	3
*****	Elective – I	3	0	0	3
*****	Elective – II	3	0	0	3
*****	Elective – III	3	0	0	3
PRACTICAL					
U7ECB27	Microwave and Optical Lab	0	0	3	2
U7ECB28	VLSI Design Lab	0	0	3	2
U7ECB29	Mini Project	0	0	6	2
Total Credits					25

SEMESTER VIII

SUB.CODE	SUBJECT	L	T	P	C
U8ECB30	Project Phase	0	0	24	12
Total Credits					12

L – Lecture; T – Tutorial; P – Practical; C - Credit **Over all Total Credits = 144**

ELECTIVES FOR SEMESTER – VII

ELECTIVE I					
SUB.CODE	**SUBJECT**	**L**	**T**	**P**	**C**
UEECB31	Digital Image Processing	3	0	0	3
UEECB32	Medical Electronics	3	0	0	3
UEECB33	Advanced Digital System Design	3	0	0	3
UECSB48	Soft Computing	3	0	0	3
UEECB35	Satellite Communication	3	0	0	3

ELECTIVE II					
SUB.CODE	**SUBJECT**	**L**	**T**	**P**	**C**
UEECB36	Advanced Digital Signal Processing	3	0	0	3
UEECB37	Opto Electronics	3	0	0	3
UEECB40	Real Time System	3	0	0	3
UEECB41	ASIC Design	3	0	0	3
UEECB34	MEMS	3	0	0	3

ELECTIVE III					
SUB.CODE	**SUBJECT**	**L**	**T**	**P**	**C**
UEECB42	Wireless Sensor Network	3	0	0	3
UEECB43	Communication protocol engineering	3	0	0	3
UECSB78	Network Security	3	0	0	3
UECSB36	High Speed Networks	3	0	0	3
UEECB39	Telecommunication Switching Techniques	3	0	0	3

L – Lecture; T – Tutorial; P – Practical; C – Credit

B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING
Curriculum &Syllabus [Regulation B (2013)]
SEMESTER I

Course Code	Course Name	L	T	P	C
THEORY					
U1GEB01	Communicative English - I	3	0	0	3
U1GEB02	Engineering Mathematics - I	3	1	0	4
U1GEB03	Engineering Physics - I	3	0	0	3
U1GEB04	Engineering Chemistry - I	3	0	0	3
U1GEB05	Basic Electrical and Electronics Engineering	3	0	0	3
U1GEB06	Engineering Graphics	3	1	0	4
PRACTICAL					
U1GEB07	Engineering Physics and Chemistry Laboratory - I	0	0	4	2
U1GEB08	Basic Electrical and Electronics Laboratory	0	0	3	2
U1GEB09	Engineering Practices laboratory	0	0	3	2
Total		18	2	10	26

SEMESTER I

U1GEB01 COMMUNICATIVE ENGLISH I **L T P C**
3 0 0 3

OBJECTIVES

- To enable all students of Engineering and Technology develope their basic communication skills in English.
- To achieve specific linguistic and communicative competence in order for them to acquire relevant skills and function efficiently in a realistic working context
- To inculcate the habit of reading for pleasure

COURSE OUTCOME

After completing this course, students will be able to:

- Respond orally to the written works, grounding their ideas in the text
- Formulate open-ended questions in order to explore a topic of interest
- Engage in analytical and critical dialogue orally
- Engage in daily, meaningful reading tasks in English class and/or at home
- Develop interpersonal skills on current problems and events

PREPREQUISITE

- Basic Grammar
- Communicative skills

COURSE CONTENTS

UNIT I COMMUNICATIVE GRAMMAR (9)

Parts of Speech -Time, Tense and Aspect -Active and Passive Voice -WH Questions & Question Tag-Concord

UNIT II COMPOSITION (9)

Vocabulary - Single word substitutes -Use of abbreviations & acronyms-Definitions and Extended Definitions-Dialogue Writing-Paragraph Writing-Report, its importance and Report Writing

UNIT III IMPORTANCE OF COMMUNICATION (9)

Process of Communication and factors -Verbal and Non-verbal Communication -Listening Skills -Reading Skills -Speaking skills -Writing skills.

UNIT IV WRITTEN SKILLS (9)

Letter writing- Formal and Informal letters-Process Description-Transcoding and transformation of information-Note taking

UNIT V INTERPERSONAL SKILLS (9)

Creative thinking - Critical thinking-Discussion of current events and problems-Offering suggestions/ solutions/ opinions

Total: 45 Periods

TEXT BOOKS

1. Andera, J.Rutherford**.** Basic Communication Skills for Technology, Second edition, Pearson Education,2007
2. Butterfield, Jeff. Soft Skills for Everyone**,** Cegage learning**,** Canada, 2011

REFERENCES

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. New York: Rutledge, 2011.
2. Morgan, David and Nicholas Regan. Take-Off: Technical English for Engineering. Garnet Publishing Limited. New York: Longman, 2008.
3. Ganesan. S, Persis Mary T & Subhashini.B. Communication in English, Himalaya Publishing House, Mumbai, 2009.
4. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. Technical English: Writing, Reading and Speaking. New York: Longman, 2009.

U1GEB02 ENGINEERING MATHEMATICS-I **L T P C**
3 1 0 4

COURSE OBJECTIVES

- To develop the basic mathematical knowledge and computational skills of the students in the areas of applied mathematics.
- To develop the skills of the students in the areas of several variable Calculus and Matrices
- To teach fundamental topics required for understanding Engineering studies

COURSE OUTCOME

On successful completion of this course, students will be able to:

- Calculate eigenvalues and eigenvectors, apply Caley-Hamilton theorem, and diagonalize of symmetric matrices and demonstrate the nature of quadratic forms
- Discuss the convergence and divergence of sequence and series of real numbers using various tests
- Demonstrate understanding of the derivatives of functions of several variables, viz., partial and total differentiation, and differentiation of implicit functions and optimize the functions of several variables using Hessian method and Lagrangian method.
- Evaluate double integration and triple integration using Cartesian, polar co-ordinates and the concept of Jacobian of transformation from one coordinate system to another coordinate system.
- Identify the improperness in integrals and evaluate the integrals using appropriate mathematical tools and how to apply beta and gamma integrals keeping improperness in mind.

PREPREQUISITE

- Basic Mathematics
- Differential Calculus
- Integral Calculus

COURSE CONTENTS

UNIT I MATRICES **9 + 3**

Characteristic equation - Eigen values and Eigen vectors of a real matrix – Statement of Cayley- Hamilton theorem – Applications of Cayley -Hamilton theorem in finding the inverse of a non-singular matrix and the power of a square matrix – Diagonalization of symmetric matrices – Nature of Quadratic forms

UNIT II SEQUENCES AND SERIES **9 + 3**

Sequences – Convergence of series – Series of positive terms – Tests for convergence (n-th term, ratio, comparison, root and integral tests) and divergence - Leibnitz test for alternating series –Series of positive and negative terms - Absolute and conditional convergence– Power series – Taylor and Maclaurin series

UNIT III DIFFERENTIAL CALCULUS OF SEVERAL VARABLES **9 + 3**

Limits and continuity- Partial Derivatives – Total derivative – Differentiation of implicit functions – inverse functions – Jacobian – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers

UNIT IV INTEGRAL CALCULUS OF SEVERAL VARIABLES 9 + 3

Double integrals- Change of order of integration – Double integrals in polar coordinates – Triple integrals – Area as a double integral – Volume as a triple integral

UNIT V IMPROPER INTEGRALS 9 + 3

Meaning of improper integrals - Beta and Gamma functions – properties –Reduction formula for Γ(n) – Relation between gamma and beta functions - Evaluation of integrals using Beta and gamma functions – simple problems

. **Total : 45+15(Tutorial) =60 periods**

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition, 2011.
2. Jain R.K and Iyengar,S.R.K Advanced Engineering Mathematics, 3rd edition, Narosa Publishing House, 2009.

REFERENCE BOOKS

1. Duraipandian P, Udayabaskaran S and Karthikeyan T, Engineering Mathematics (I Year) Muhil Publishers, 2010
2. Kreyszig E, , Advanced Engineering Mathematics, 9th edition, Wiley, 2005.
3. Peter O' Neil, Advanced Engineering Mathematics, Cengage Learning, Boston, USA, 2012.

U1GEB03 ENGINEERING PHYSICS – I **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To understand the basic laws of physics and their applications in engineering and technology.
- To develop scientific temper and analytical capability.
- To solve various engineering problems.

COURSE OUTCOME

Students undergoing this course will

- Have a fundamental understanding of basic physics concepts and its applications in a day to day life, demonstrate the knowledge in ultrasonic applications and its importance and explain the utilizations of the electron beams in modern technologies such s CRT, CRO, etc.
- Be able to explain the basic understandings of the matter, crystal structure and its fundamental properties including crystal systems and Miller indices and show their understanding of the conductivity nature of metals and the classification of the solids learned from the Band Theory of Solids.
- Be able to understand the widely used current technologies such as mobile phones, solar cells for which semiconductor technology is essential. The concept of semiconductors and its wide applications will motivate the students to the currently developing topics.

PREPREQUISITE

- Basic Mathematics
- Basic Science

COURSE CONTENTS

UNIT-I: ACOUSTICS **9**

Introduction, sound waves - Pitch and Intensity. Reflection of sound waves, Sabine formula, absorption of sound, reverberation theory. Ultrasonic's – production - magnetostriction oscillator and piezoelectric oscillator. Properties and applications.

UNIT -II: ELECTRON OPTICS **9**

Introduction, Electron-refraction-Bethe's law, Electron Gun and Electron Lens. Cathode Ray Tube and Cathode Ray Oscilloscope. Cyclotron, Bainbridge Mass Spectrograph. Optical microscope, Electron Microscope - Applications.

UNIT -III: CRYSTAL STRUCTURES AND X-RAYS **9**

Introduction, Space lattice, unit cell, lattice parameters, Bravais Lattice - Crystal systems. Characteristics of Unit cell (Cubic System). Miller indices of planes. X-Rays –production, Bragg's Law. Powder crystal method and rotating crystal method.

UNIT -IV: BAND THEORY OF SOLIDS **9**

Introduction, Electrical conduction, conductivity, drift velocity, influence of external factors on conductivity. The Band Theory of solids, Energy Bands, Energy Gap. Classification of

solids, Energy Band structure of a conductor. Fermi-Dirac distribution function and Fermi Energy. Energy Band structure of an Insulator and semiconductor.

UNIT -V: SEMICONDUCTORS 9

Introduction, Types- Intrinsic and Extrinsic semiconductors. Intrinsic carriers-electron and hole concentrations. Fermi level in intrinsic carrier density, Conductivity, Doping of impurities-N-type and P-Type. Temperature variation-law of mass action-Charge neutrality condition- Fermi level in extrinsic semiconductor-Hall effect. Applications- Semiconductor diode, Transistor, FET, MOSFET.

Total: 45 periods

TEXT BOOKS

1. M.N. Avadhanulu and P.G. Kshirsagar ,A Text Book of Engineering Physics, S.CHAND and Co, 2012.
2. Gaur and Gupta, Engineering Physics , Dhanpat Rai publications, 2009

REFERENCES

1. S.O.Pillai ,Solid State Physics,New age international publications, 2010.
2. M.Arumugam, Engineering Physics,Anuradha publications, 2009.
3. Charles Kittel ,Introduction to Solid State Physics ,Wiley India publications, 2009.
4. Introduction to Solids –L.Azaroff TMH,33rd Reprint 2009.
5. Materials Science and Engineering – William Calister – Wiley India- Sixth Edition 2009.
6. www.schandgroup.com, www.google.com

U1GEB04 ENGINEERING CHEMISTRY- I **LTPC**
3 0 0 3

COURSE OBJECTIVE

The basic objective of Engineering Chemistry is to educate the students about the chemical aspects of engineering and to provide leadership in advanced studies of engineering, in industry, academia and government.

COURSE OUTCOME

After completing first semester, students from all branches of engineering will possess:

- Students will have knowledge about the design of boilers and its conditioning methods
- Students will develop understanding of the concepts and importance of the domestic water treatment methodology which is useful for the industries.
- Students will have knowledge about the industrial applications of adsorption techniques.
- Students will have knowledge about the energy sources and batteries along with the need of new materials to improve energy storage capabilities.
- Students will have understanding about spectroscopic instruments required for discovery and characterization methods of new materials.

PREPREQUISITE

- Basic Mathematics
- Basic Science

COURSE CONTENTS

UNIT- I WATER TECHNOLOGY (9)

Introduction- Hardness-Types and estimation by EDTA method-Boiler feed water-requirements- disadvantages of using hard water in boilers- internal conditioning (phosphate, calgon and carbonate conditioning methods)-external conditioning method-demineralization process-desalination-reverse osmosis- Electrodialysis- Domestic water treatment.

UNIT- II SURFACE CHEMISTRY (9)

Introduction-types of adsorption-adsorption of gases on solids, solute from solution-adsorption isotherm- Freundlich and Langmuir adsorption isotherm- Role of adsorbent in catalysis- ion exchange reaction- chromatography – applications of adsorption in industries – role of activated carbon in pollution abatement of air and waste water- Industrial applications of adsorption.

UNIT III ELECTROCHEMISTRY (9)

Electrochemical cells- reversible and irreversible cell- EMF measurement - single electrode potential- Nernst equation-problems-reference electrode- SHE-Calomel electrode-Glass electrode-measurement of p^H-electrochemical series- significance- potentiometric titration – precipitation titration –conductometric titration.

UNIT- IV ENERGY SOURCES AND STORAGE DEVICES (9)

Renewable and non renewable energy resources- nuclear fission- fusion-chain reaction-nuclear energy- nuclear reactor–light water nuclear power plant- wind energy- solar energy-tidal energy- types of battery- alkaline battery- lead acid- nickel cadmium-lithium battery-H_2-O_2 fuel cells.

UNIT –V SPECTROSCOPY (9)

Introduction- Electromagnetic radiation- absorption of electromagnetic radiation- interaction of electromagnetic radiation with matter- Beer- Lambert's law- principle & instrumentation of UV- Visible spectroscopy, IR spectroscopy- estimation of iron by colorimetry- flame photometry- instrumentation (block diagram)- estimation of sodium by flame photometry- Microwave spectroscopy and its applications.

Total : 45 periods

TEXT BOOKS

1. P.C.Jain and Monica Jain - "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi (2002).
2. S.S.Dara- "A Text book of Engineering Chemistry" S.Chand&Co.Ltd., New Delhi (2006).
3. Ravikrishnan– Engineering Chemistry, Sri Krishna Publication, Chennai.

REFERENCES

1. B.K.Sharma - "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001) .
2. B.Sivasankar - "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd. New Delhi (2008).
3. B.R.Puri, L.R.Sharma, S.Pathania - "Principles of physical Chemistry,ShobanLalnagin Chand & Co., Jalandhar (2000).

U1GEB05 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LTPC
3 0 0 3

COURSE OBJECTIVES:

- To impart knowledge in various AC circuit parameters.
- To impart knowledge in various DC circuit parameters.

COURSE OUTCOME

- Students are expected to learn the physical recognition of different electrical components like Resistances, Inductances, Capacitances and their ratings.
- Students are expected to have learnt the verifications of basic laws of electric circuits like Ohm's law and Kirchhoffs' laws.
- Students are expected to connect electric circuits, and able to use electric instruments to perform experiments.

COURSE CONTENTS

UNIT I D.C.CIRCUITS 9

Electrical quantities, Ohm's Law, Resistors, Inductors, Capacitors - Series and parallel combinations, Kirchhoff's laws, source transformation, Node and Mesh Analysis - Star delta Transformation.

UNIT II MAGNETIC CIRCUITS 9

Definition of MMF, Flux and reluctance - Leakage factor - Reluctances in series and parallel (series and parallel magnetic circuits) - Electromagnetic induction - Fleming's rule - Lenz's law - Faraday's laws - statically and dynamically induced EMF - Self and mutual inductance - Energy stored and energy density - Analogy of electric and magnetic circuits.

UNIT III A.C.CIRCUITS 9

Sinusoidal functions - RMS(effective) and Average values- Phasor representation - J operator – sinusoidal excitation applied to purely resistive , inductive and capacitive circuits - RL , RC and RLC series and parallel circuits - power and power factor - Three phase circuits - Star / delta connections - with balanced loads - measurement of power by two wattmeter method.

UNIT IV SEMICONDUCTOR DEVICES AND LOGIC GATES 9

Discrete devices - PN junction diodes - Zener diodes - Tunnel diodes- Thermistors - Bipolar junction transistors- Field effect transistors (FET and MOSFET) –Uni junction transistors - Silicon controlled rectifiers and Triacs. Universal Gates - Half Adder - Full Adder.

UNIT V RECTIFIERS, AMPLIFIERS AND OSCILLATORS 9

Half and full wave rectifiers- Capacitive and inductive filters- ripple factor- PIV-rectification efficiency. CB, CE and CC Configuration - RC coupled amplifier- positive and negative feedback - Barkhausen criterion for oscillations -RC and LC oscillators.Introduction to power supplies.

TOTAL: 45Periods

TEXT BOOKS

1. Mittle.B.N, Aravind Mittle, "Basic Electrical Engineering", Tata McGraw Hill", 2nd Edition. Sep 2005.
2. Theraja.B.L, "Fundamentals of Electrical Engineering and Electronics", S.Chand & Co., 1st Multicolor Edition, 2006 (Reprint 2009).
3. Sedha.R.S, A Text book of Applied electronics, 2nd Edition, S.Chand & company, 2005.
4. Bhattacharya.S.K and Renu vig, Principles of electronics, 3rd Edition, S.K.Kataria & Sons, 2002

REFERENCES

1. Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Learning Private Ltd, 2nd Edition, 2010.
2. Wadhwa.C.L, "Basic Electrical Engineering", New Age International, 4th Edition, 2007. (Reprint June 2010)
3. Abhijit Chakrabarti, Sudipta nath & Chandan Kumar Chanda, "Basic Electrical Engineering", Tata McGraw Hill, 1st Edition, 2009.
4. T. Thyagarajan, “Fundamentals of Electrical Engineering”, SciTech Publications, 5th Edition, Reprint Jan 2010.
5. books.google.co.in/books/.../Basic_Electrical_Engineering.ht
6. www.e-booksdirectory.com › Engineering

U1GEB06 ENGINEERING GRAPHICS L T P C
(First angle projection method is to be followed) 3 1 0 4

COURSE OBJECTIVES

- To familiarize the students with the construction methods of various objects and their applications.
- To understand the basic concepts of conic sections, projections and developments of objects.
- To develop the imagination and drafting skills of students.

COURSE OUTCOME

- Frame ideas based on the conceptual modelling and design
- Provide good understanding of the methods involved in preparing various views in engineering drawings

COURSE CONTENTS
INTRODUCTION (Not to be included for examination)

Drawing instruments and their use – Bureau of Indian Standards (BIS) conventions – free-hand lettering – dimensioning – simple geometric constructions.

UNIT I: CONIC SECTIONS AND FREE HAND SKETCHING 9+3
Construction of ellipse (concentric circle and eccentricity methods), construction of parabola (rectangle and eccentricity methods), construction of hyperbola (eccentricity method) Free-hand sketching of orthographic views of pictorial views of solids – free-hand sketching of pictorial views of solids given the orthographic views.

UNIT II: PROJECTION OF POINTS, STRAIGHT LINES & PLANES 9+3

Orthographic projections of points, orthographic projections of straight lines located in the first quadrant only – determination of true lengths and true inclinations – orthographic projections of polygonal surface and circular lamina inclined to both reference planes.

UNIT III: PROJECTIONS OF SOLIDS 9+3

Projections of simple solids (prisms, pyramids, cylinder and cone) when the axis is inclined to one reference plane by change of position and change of reference line methods.

UNIT IV: SECTIONS OF SOLIDS & DEVELOPMENT OF SURFACES 9+3
Sections of solids (prisms, pyramids, cylinder and cone) in simple vertical position by using cutting plane inclined to one reference plane and perpendicular to the other – obtaining true shape of section.
Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinder and cone – development of lateral surfaces of solids with cylindrical cutouts perpendicular to the axis.

UNIT V: ISOMETRIC & PERSPECTIVE PROJECTION 9+3

Principles of isometric projection - isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones – isometric view of combination of two simple solids.Perspective projection of prisms, pyramids and cylinder by visual ray method and vanishing points method.

Total : 45+15(Tutorial) =60 periods

BEYOND THE SYLLABUS

Scales and Dimensioning Principles, Intersection of solids, Computer Aided Drafting, Development of solid surfaces with square cut –out, Building Drawings.

TEXT BOOKS

1. K.V.Natarajan, A text Book of Engineering Graphics, Dhanalakshmi Publisher, Chennai – 42, 2009
2. 2.Venugopal K., "Engineering Graphics", New Age International (P) Limited, 2002.

REFERENCES

1. 1.Warren J. Luzadder and Jon. M.Duff, "Fundamentals of Engineering Drawing", Prentice Hall of India Pvt., Ltd., Eleventh Edition, 2001.
2. B.Bhattacharyya, S.C.Bera,Engineering Graphics ., I.K .International Pvt Ltd., 2009
3. M.S. Kumar ., Engineering Graphics.,Dd Publications, 2008
4. Jeyapoovan.T., Vikas Publishing House Engineering Graphics with using Auto CAD,2007
5. BIS code: SP 46:2003 Engineering Drawing practice for Schools & Colleges
6. http://www.teachertube.com, ***Engineering Graphics.***
7. http://www.ustudy.in, Engineering Graphics

U1GEB07 ENGINEERING PHYSICS AND CHEMISTRY LABORATORY

L T P C
0 0 4 2

COURSE OBJECTIVES

- To impart skills in measurements.
- To design and plan the experimental procedure and to record and process the results.
- To reach non trivial conclusions of significant of the experiments.

COURSE OUTCOME

After the completion of the experiments in Physics lab, students gain

- Skills on measurements
- Knowledge to design
- Plan the experimental procedure
- To record and process the results
- Ability to analyze the results

ENGINEERING PHYSICS LAB

1. **Torsional Pendulum**
   To determine the moment of inertia of the disc and the rigidity modulus of the wire by Torsional oscillations.
2. **Newtons' Rings**
   To find the focal length of a lens by forming Newton's ring.
3. **Dispersive power of the Prism**
   To find the dispersive power of the material of the prism using spectrometer.
4. **Laser Grating**
   (i) Determination of wavelength of Laser using Grating and Particle size determination
   (ii) Determination of Numerical Aperture and Acceptance angle of an Optical Fibre
5. **Ultrasonic Interferometer**
   Determination of Velocity of ultrasonic waves in a liquid and compressibility of the liquid.
6. **Young's Modulus – Non-Uniform Bending**
   To determine Young's modulus of the material of the beam by Non uniform bending method.

ENGINEERING CHEMISTRY LABORATORY

AIM

To understand the principles and technological knowledge involved in electrical and non-electrical experiments in chemistry.

OBJECTIVES

Students should develop the experimental skills both manually and by instrumentation of "qualitative and quantitative analysis" of solutions.

LIST OF EXPERIMENTS
(ANY FIVE)

1. Estimation of hardness of Water by EDTA.
2. Determination of DO in water (Winkler's Method).
3. Estimation of Chloride in Water sample (Argentometric).
4. Estimation of alkalinity of Water sample.
5. Conductometric titration (Strong acidVs Strong base).
6. Conductometric precipitation titration using $BaCl_2$Vs Na_2 SO_4.

U1GEB08 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

L T P C
0 0 3 2

COURSE OUTCOME

- Students are expected to perform good in viva voce exams
- Students are expected to verify various laws using electrical instruments
- Students are expected to verify ratings for various components like CFL's, fluorescent tube etc
- Students are expected to perform open circuit and short circuit tests on transformers and get familiar with various electric motors and their construction

COURSE OBJECTIVES:

- To verify Kirchhoff's laws
- To make the students to understand the circuit parameters and their influence.

(ANY TEN EXPERIMENTS)

1. a. Staircase wiring and lamp wiring.
   b. Measurement of Electrical Quantities.
2. Characteristics of PN junction Diode.
3. Characteristics of BJT
4. Verification of Kirchhoff's laws.
5. Verification of logic gates.
6. Study of CRO and measurement of frequency and phase difference using CRO.
7. Frequency response of series RLC circuits.
8. Characteristics of FET.
9. Transient response of series RL and RC circuits.
10. Half wave and full wave rectifier using diodes.
11. RC filters.

U1GEB09 ENGINEERING PRACTICE LABORATORY **L T P C**
0 0 3 2

COURSE OBJECTIVES

To have wide knowledge on

- Plumbing tools – house hold plumbing fittings and Carpentry process – Carpentry tools, types of joints.
- Types of welding & tools.
- Types of machining and operations, machine tools, cutting tools (Lathe, Drilling).
- Sheet metal – definition, working tools, operations - forming & bending.

COURSE OUTCOME

Students undergoing this laboratory will

- Demonstrate wide knowledge on mechanical and civil operations

I CIVIL ENGINEERING PRACTICE

Plumbing Works:

a) Preparation of plumbing line sketches for
   i. water supply line
   ii. sewage works.

b) Basic pipe connections using valves, taps, couplings, unions, reduces elbows in house hold fitting.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise:

Power sawing, Power Planning and making various joints.

II MECHANICAL ENGINEERING PRACTICE

Welding:

(a) Preparation of Arc welding practice – butt joints and lap joints.

(b) Preparation of Gas welding practice – butt joints and lap joints.

Basic Machining:

(a) Simple Turning and Taper turning in lathe.

(b) Drilling Practice.

Sheet Metal Work:

(a) Forming & Bending:

(b) Model making – Trays, funnels, etc.

SEMESTER II

COURSE CODE	COURSE NAME:	L	T	P	C
THEORY					
U2GEB10	Communicative English-II	3	0	0	3
U2GEB11	Engineering Mathematics –II	3	1	0	4
U2GEB12	Engineering Physics – II	3	0	0	3
U2GEB13	Engineering Chemistry – II	3	0	0	3
U2GEB14	Basics of Mechanical and Civil Engineering	3	0	0	3
U2GEB15	Fundamentals of Computing and Programming	3	0	0	3
PRACTICAL					
U2GEB16	Computer Practice Laboratory	0	0	3	2
U2GEB17	Engineering Physics & Chemistry Laboratory-II	0	0	4	2
U2GEB18	Communication Skills Laboratory	0	0	3	2
Total Credits		**18**	**1**	**10**	**25**

SEMESTER II

U2GEB10 COMMUNICATIVE ENGLISH II **L T P C**
3 0 0 3

OBJECTIVES

- To enable the students to become aware of their present communication skills and the skills they will need to function as successful professionals.
- To encourage them to acquire the necessary skills so that they can handle day to-day personal and professional responsibilities
- To build their confidence and to instill competitiveness by projecting a positive image of themselves and their future

COURSE OUTCOME

After undergoing this course, students will be able to:

- Communicate using modal verbs, conditionals, gerund and articles
- Write, compare, contrast, and analyze articles on a given topic using Synonyms, Antonyms, and Homonyms
- Prepare themselves in pre-interview process
- Respond in group discussion, literal, interpretative, and evaluative stances.

COURSE CONTENTS

UNIT I COMMUNICATIVE GRAMMAR (9)

Modal verbs-Conditionals — 'If' clauses-Cause and Effect –Gerund-Articles

UNIT II WRITING SKILLS (9)

Synonyms, Antonyms and Homonyms -Word Formation -Nominal compounds –Instructions-Mini project writing

UNIT III WRITING AT WORK (9)

Business letters-Email, Fax, Memo-Notice, Circulars-Job Applications - Dos and don'ts-CV and Cover letter

UNIT IV CORPORATE COMMUNICATION (9)

Group Discussion-Interview Skills-Types of meeting-Agenda, Minutes

UNIT V CONVERSATION SKILLS (9)

Presentation Skills-Persuasive speech-Dealing with clients-Crisis management Trouble Shooting

Total: 45 periods

TEXT BOOKS

1. Andera, J.Rutherford. Basic Communication Skills for Technology, Second edition, Pearson Education,2007
2. Butterfield, Jeff. Soft Skills for Everyone, Cegage learning, Canada, 2011

REFERENCES

1. Ganesan. S, Persis Mary T & Subhashini.B. Communication in English, Himalaya Publishing House, Mumbai, 2009.
2. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. Technical English: Writing, Reading and Speaking. New York: Longman, 2010.
3. Rizvi, M.Ashraf. Effective Technical Communication. New Delhi: Tata McGraw-Hill Publishing Company, 2007.
4. Morgan, David and Nicholas Regan. Take-Off: Technical English for Engineering. Garnet Publishing Limited. New York: Longman, 2008.
5. Meenakshi Raman and Sangeeta Sharma, 'Technical Communication English skills for Engineers', Oxford University Press, 2008.
6. http://www.lonestar.edu/useful-websites-for-students.htm
7. www.english-for-students.com/
8. www.britishcouncil.org
9. www.sfsu.edu/~puboff/onestop.htm
10. www.uefap.com
11. www.eslcafe.com
12. www.listen-to-english.com
13. www.owl.english.purdue.edu
14. www.chompchomp.com

U2GEB11 ENGINEERING MATHEMATICS–II L T P C

3 1 0 4

AIM AND OBJECTIVES

- To develop the skills of the students in the areas of Vector Calculus, Integral Calculus, Complex variables, Laplace Transform and ordinary differential equations
- To teach fundamental topics required for understanding Engineering studies
- To serve as a pre-requisite mathematics course for post graduate courses, specialized studies and research

COURSE OUTCOME

On successful completion of this course, students will be able to:

- Take Laplace transformation of different types of functions, derivatives and integrals, and how it converts complex systems into simple algebraic equations to find out solutions
- Demonstrate the understanding of solving ordinary differential equations using operator methods, method of undetermined coefficients, method of variation of parameters and Laplace transformation techniques
- Perform gradient, divergence and curl operations in vector and scalar fields, apply Green's theorem, Gauss Theorem, and Stokes theorem as the generalization of fundamental theorem of Integral calculus.
- Distinguish between real function differentiation and complex function differentiation, applicability of analytic and harmonic nature of complex valued function in electrical engineering and study of fluids
- Apply complex integration using Cauchy's integral theorem and Cauchy's residue theorem and their applications in evaluating integrals.

COURSE CONTENTS

UNIT I LAPLACE TRANSFORM 9 + 3

Laplace transform – Sufficient Condition 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 - Inverse Laplace transform– Convolution theorem (excluding proof) – Initial and Final value theorems

UNIT II ORDINARY DIFFERENTIAL EQUATIONS 9 + 3

Higher order linear differential equations with constant coefficients –Method of undetermined coefficients - Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients – Solution of linear ODE of second order with constant coefficients using Laplace transform

UNIT III VECTOR CALCULUS 9 + 3

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 parallelepipeds.

UNIT IV ANALYTIC FUNCTIONS 9 + 3

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

UNIT V COMPLEX INTEGRATION 9 + 3

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor and Laurent expansions – Singular points – Residues – Residue theorem – Application of residue theorem to evaluate real integrals –Unit circle and semi-circular contour(excluding poles on boundaries).

Total: 45+15=60 periods

TEXT BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, (2011).
2. Jain. R. K and. Iyengar, S.R.K, Advanced Engineering Mathematics, 3rd edition, Narosa Publishing House, 2009

REFERENCE BOOKS

1. Sundarapandian V, Ordinary and Partial Differential Equations, McGraw Hill Education, New Delhi, India, 2012.
2. Kreyszig E, , Advanced Engineering Mathematics, 9th edition, Wiley, 2005.
3. Peter O' Neil, Advanced Engineering Mathematics, Cengage Learning, Boston, USA, 2012.
4 Dean G. Duffy. Advanced Engineering Mathematics with MATLAB, 2ndEdn. Chapman & Hall / CRC Press.New York, 2003 (Taylor and Francis, e-library, 2009)

U2GEB12 ENGINEERING PHYSICS – II **L T P C**
3 0 0 3

OBJECTIVES

- Basically this is a basic course to understand properties of various materials.
- To develop basic understanding of the rapidly changing technological scenario.
- To impart the requisite understanding for the appropriate selection of materials for various engineering applications.

COURSE OUTCOME

Students undergoing this course will have

- An in depth knowledge in various aspects of Physics and its applications
- A clear understanding of quantum physics, Laser and Fiber Optics in engineering and technology
- The basic understanding of fundamental properties of Modern engineering materials such as magnetic, dielectric, conducting, semiconducting, superconducting materials and its use in technology and day to day life
- The potential in planning projects at higher semesters
- The sound knowledge about the basic concepts of the novel and emerging nanotechnology and the various preparation methods of nonmaterial such as CVD, PLD and so on. Further, use of nanotechnology in daily life will stimulate and motivate the students towards manufacturing or research.

COURSE CONTENTS

UNIT -I ATOMIC PHYSICS **9**

Introduction, ultraviolet catastrophe, Planck's Quantum hypothesis, Photoelectric effect, Measurement of K.E. of photoelectrons, stopping potential. Failures of Classical theory. Compton effect, Compton Theory. Dual nature of matter. deBroglie Hypothesis. Davisson – Germer Experiment, Heisenberg's Uncertainty Principle (Statement only). Time-In dependant Schrodinger wave equation, Eigen values, Eigen functions and Expectation values. Applications of Schrodinger wave equation- Particle in a box.

UNIT -II LASERS AND OPTICAL FIBERS **9**

Introduction, Interaction of Radiation with Matter –Quantum mechanical view. Essentials of Laser. Types of Laser He-Ne Laser, Ruby Laser, semiconductor Laser. Application of Lasers. Optical Fibers –Modes of Propagation, Types of optical fibers. Optical fiber communication system. Attenuation.

UNIT-III SUPERCONDUCTIVITY **9**

Discovery of superconductivity, , Heat Capacity, Isotope effect, persistent currents, effect of external magnetic field, critical; current density, Behavior of a perfect conductor, Meissner effect, London penetration depth. BCS Theory. Type of superconductors. Josephson effect (AC and DC). Applications – Maglevs, SQUIDS.

UNIT -IV MAGNETIC AND DIELECTRIC MATERIALS **9**

Introduction- Measurement of Magnetic Susceptibility-Magnetic materials (Dia, Para, Ferro, Antiferro and Ferri)- Magnetic moment of atom-Hard and soft magnetic materials- Hysteresis

curve – Applications-Dielectrics-– Electronic, ionic and orientational, space polarizations – Internal fields in solids – Polarization-Induced dipoles-Nonpolar and Polar dielectries-Clausius Mosotti equation-Dielectric loss.

UNIT -V NANOTECHNOLOGY AND ADVANCED MATERIALS 9

Introduction– Nano phase materials – Synthesis – Plasma arcing – chemical vapour deposition – Sol gel method – Electro deposition – Ball milling – properties and application – Carbon nano tubes – types, fabrication methods – Arc method – Pulsed laser deposition – Structure, Properties and Application.

Total: 45 periods

TEXT BOOKS

1. M.N.Avadhanulu and P.G.Kshirsagar ,A Text Book of Engineering Physics, S.CHAND and Co,2012.
2. Gaur and Gupta, Engineering Physics , Dhanpat Rai publications,2009

REFERENCES

1. T.Pradeep ,The essential understanding –Nanoscience and Nanotechnology-TMH, 2010.
2. William D.Callister ,Materials Science and Engineering, John Wiley &Sons- 2010
3. Charles Kittel ,Introduction to Solid State Physics -Wiley India publications,2009.
4. Mathews and Venkatesan ,Quantum Mechanics - TMH, 2008.
5. Anthony R. West, Introduction to Solid State Chemistry –Wiley India edition, 1999.
6. www.schandgroup.com

U2GEB13 ENGINEERING CHEMISTRY II **L T P C**
3 0 0 3

COURSE OBJECTIVES

Student should be conversant with the

Principles of corrosion and its control
Chemistry of Fuels and combustion
Industrially Important Engineering materials

COURSE OUTCOME

After completing second semester,

- Students will have knowledge about fuels and importance of new compounds which can be used as fuels
- Students will be acquainted with industrially important engineering polymers, their nature, chemical compositions and mode of action
- Students will have knowledge about the alloys which are useful to design the new materials for domestic and industrial purpose
- Students will show understanding about the methods available for corrosion control and their utility in automobile and other industries

COURSE CONTENTS

UNIT-I FUELS (9)

Classification, Characteristics of fuel, Comparison between Solid, liquid and gaseous fuels, Combustion and chemical principles involved in it, Calorific value: gross and net calorific values.

Solid Fuels: Coal: Classification, Analysis: Proximate and Ultimate analysis of coal and their importance, Metallurgical coke: Properties, Manufacture by Otto Hoffman process.

Liquid Fuels: Petroleum: its chemical composition and fractional distillation, Synthetic Petrol: Fischer-Tropsch process and Bergius Process, Knocking and chemical structure, octane number and cetane number and their significance,

Gaseous Fuels: Natural gas, artificial gas (water gas, producer gas, coal gas). Flue gas analysis – Orsat apparatus

UNIT-II PHASE RULE AND ALLOYS (9)

Statement and explanation of the terms involved- one component water system- condensed phase rule-construction of phase diagram by thermal analysis-simple eutectic systems (Lead-Silver system only) – Alloys - importance – ferrous alloys – Nichrome - stainless steel – non-ferrous alloys - brass and bronze.

UNIT-III POLYMERS (9)

Polymer, Classification based on, origin, structure, chemical structure, Degree of polymerization Types of polymerization - Thermosetting and Thermoplastic polymers and their applications-Degradation of polymers, Conducting polymer and Biopolymers, Introduction to polymeric composites, Types of composite materials.

UNIT-IV CORROSION AND ITS CONTROL (9)

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion –

corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

UNIT-V ENGINEERING MATERIALS (9)

Refractories - Classification and properties, Lubricants- Classification and properties, Organic electronic materials - Solid oxide materials- Nano materials, Buckminister fullerenes.

Total: 45 periods

TEXT BOOKS

1. Jain & Jain, Engineering Chemistry, DhanpatRai&Company(2002).
2. S.S. Dara, Engineering Chemistry, S. Chand Pvt. Ltd.(2006).
3. A. Ravikrishnan and S. Sathish Kumar – Engineering Chemistry, Sri Krishna Publication, (2012) Chennai.

REFERENCES

1. J.C. Kuriacose& J. Rajaram, Chemistry in Engineering & Technology (Vol I & II),Tata McGraw Hill(2010).
2. H.D. Gesser, Applied Chemistry, Springer(2012).
3. V.R.Gowarikar, V.Viswanatha, Jayadevsreedhar, Polymer Science, Wiley(2006).
4. G. T. Austin, Shreve's Chemical Process Industries, Tata McGraw Hill(1984)
5. http://en.wikipedia.org/wiki/Fuel
6. http://en.wikipedia.org/wiki/Materials_science
7. http://www.ce.berkeley.edu/~paulmont/CE60New/alloys_steel.pdf

U2GEB14 FUNDAMENTALS OF COMPUTING AND PROGRAMMING

L T P C

3 0 0 3

OBJECTIVES

- Learn the fundamentals of computing techniques
- Develop the simple applications in 'C' language

COURSE OUTCOME

After completing this course,

- Students are expected to perform C programs
- Students are expected to gain knowledge regarding the challenging programs
- Students are expected to know about the problem solving techniques
- Students are expected to know about the pointer concepts and file management techniques

COURSE CONTENTS

UNIT I BASICS OF COMPUTER AND INFORMATION TECHNOLOGY 9

Digital Computer Fundamentals–Block diagram of a computer–Components of a computer system–Applications of Computers–Hardware and Software definitions–Categories of Software–Booting–Installing and uninstalling Software–Software piracy–Software terminologies-Information Technology Basics–History of Internet–Internet Tools.

UNIT II PROBLEM SOLVING METHODOLOGY 9

Problem solving Techniques–Program–Program development cycle–Algorithm – Flow chart – Pseudo Code – Program control structures – Types and generation of programming languages – Development of algorithms for simple problems.

UNIT III INTRODUCTION TO C 9

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operations – Decision Making - Branching and Looping.

UNIT-IV FUNCTIONS 9

Arrays- Character arrays and Strings - Defined Functions - Definition of Function – Declaration - Category of Functions - Nesting of Functions, Recursive function, Structures and Unions, Enumeration and Typedef.

UNIT V POINTERS, FILE MANAGEMENT AND OPERATING SYSTEM CONCEPTS 9

Pointers – File Management in C – Input / Output Operations on Files -The Preprocessor, Introduction to UNIX and LINUX programming.

TOTAL: 45 Periods

TEXT BOOKS

1. Reema Thareja, " Fundamentals of Computing & C Programming" Oxford University Press, 2012.
2. E.Balagurusamy, "Programming in ANSI C", Fifth Edition, Tata McGraw-Hill, 2011.

3. Ashok.N.Kamthane," Computer Programming", Fifth Edition Pearson Education, 2008.
4. Richard Petersen, "Linux: The Complete Reference", Sixth Edition, Tata McGraw-Hill,2007
5. ITL Education Solutions Limited, 'Introduction to Information Technology', Pearson Education (India), 2005.

REFERENCES

1. P.Visu, R.Srinivasan and S.Koteeswaran, "Fundamentals of Computing and Programming", Fourth Edition, Sri Krishna Publications, 2012.
2. E.Balagurusamy, "Computing Fundamentals and C Programming", Tata McGraw-Hill,2008.
3. Pradip Dey, Manas Ghoush, "Programming in C", Oxford University Press, 2007.
4. Byron Gottfried, "Programming with C", 2 Edition, TMH Publications, 2008.
5. Stephen G.Kochan, "Programming in C", Third Edition, Pearson Education India, 2005.
6. http://www.tutorialspoint.com/computer_fundamentals/
7. http://www.indiabix.com/computer-science/computer-fundamentals/
8. http://www.placementquestion.com/category/computer_fundamentals/
9. http://www.proprofs.com/quiz-school/story.php?title=fundamentals-computer-part-1

U2GEB15 BASIC MECHANICAL AND CIVIL ENGINEERING LT P C
3 0 0 3

OBJECTIVES

To gain a wide knowledge on:

- Manufacturing processes.
- Combustion engines.
- Refrigeration & Air-conditioning system.
- Construction Materials.

COURSE OUTCOME

After completing this course,

- The students can easily apply any of the tasks in their core technical subjects for making and working of any type of product
- The students will be able to analyze the material on the basis of their properties and thus assigning different weightage to their use for technical purposes
- The students will be able to assess the working conditions of any machining process and thus calculating the actual forces involved

COURSE CONTENTS

UNIT I MANUFACTURING PROCESSES 9

Introduction to Manufacturing & Machining - The Metal cutting process - Orthogonal and oblique metal cutting. Types of Machining Operations & Terminology – The Cutting Tool. Introduction to metal forming - Bulk deformation & Sheet metal working – Basic operations - Hot forming and cold forming. Introduction to Metal Joining Processes - Welding processes - Arc & Gas welding - AC & DC welding equipments - Brazing and soldering.

UNIT II COMBUSTION ENGINES 9

Principle of Internal and external combustion engines – Petrol engine, diesel engine, working principle and comparison - Two stroke and four stroke engines, working principle and comparison - Alternative fuels.

UNIT III REFRIGERATION & AIR-CONDITIONING SYSTEM 9

Introduction to Refrigeration– Non cyclic & Cyclic Refrigeration - Principle of vapour compression refrigeration system - Applications. Air-Conditioning – Layout of typical domestic refrigerator – Window and Split type Air conditioner – Applications

UNIT IV INTRODUCTION TO CIVIL ENGINEERING 9

Civil engineering --Importance of civil engineering -- Branches of civil engineering – Structures.

UNIT V CONSTRUCTION MATERIALS 9

Soil – Stones – Bricks – Timber -- Cement -- Concrete – Steel. Bearing capacity of soil -- Requirements of foundations -- Types of foundations.

TOTAL : 45periods

TEXT BOOKS

1. P K Nag., “Basic Mechanical Engineering”, Hi-tech Publications, (2007).
2. Ramamrutham. S, “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd. (2004).
3. K.V. Natarajan, “Basic Civil Engineering”, M/s Dhanalakshmi, Chennai, 2010
4. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”,Tata McGraw Hill Publishing Co., New Delhi, (2006).

REFERENCES

1. Rao P.N., “Manufacturing Technology”, 2nd Edition, Tata McGraw Hill Inc., New Delhi.
2. Surendra Singh, “Building Materials ", Vikas Publishing Company, New Delhi, 1996.
3. Khurmi R.S. & Gupta J.K., " A Text Book of Thermal Engineering “, S.Chand &Co., New Delhi, 2010
4. Campbell J.S., “Principles of Manufacturing Materials and Processes”, 14th Edition,Tata McGraw Hill.Inc., New Delhi, 2000.
5. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-ROORKEE/MANUFACTURING-PROCESSES/index.htm
6. http://www.animatedengines.com/
7. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Ref%20and%20Air%20Cond/New_index1.html
8. http://en.wikipedia.org/wiki/List_of_building_materials

U2GEB16 COMPUTER PRACTICE LABORATORY L T P C
0 0 3 2

COURSE OBJECTIVES

- To Practice the concepts of MS Word and MS excel
- To learn the C control structure and functions.
- To study the C Pointers and file system.

COURSE OUTCOME

After completing this course,

- Students are expected to design a program related to challenging questions
- Students are expected t have knowledge about MS word and the internet
- Students are expected to know and perform the programs regarding the classes
- Students are expected to perform well in sessional tests/class assignments/viva-voce examination

LIST OF EXPERIMENTS

1) Word Processing

a. Document creation, Text manipulation with Scientific notations.
b. Table creation, Table formatting and Conversion.
c. Mail merge and Letter preparation.
d. Drawing - flow Chart

2) Spread Sheet

a. Chart - Line, XY, Bar and Pie.
b. Formula - formula editor.
c. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
d. Sorting and Import / Export features

3. Find whether a given number is odd or even.
4. Find whether a given number is prime or not.
5. Design an arithmetic calculator using Switch-Case.
6. Find largest and smallest elements in an array.
7. Demonstrate Looping and Control structures.
8. Demonstrate the String functions.
9. Find a Factorial of a number of ranges between 1 to 41 using Recursive function.
10. Demonstrate the Structures and Unions for employee salary.
11. Perform pointer arithmetic Operations.
12. Program to develop student's information using file concept.

U2GEB17 ENGINEERING PHYSICS AND CHEMISTRY LABORATORY II

L T P C
0 0 4 2

COURSE OBJECTIVES

- To impart skills in measurements.
- To design and plan the experimental procedure and to record and process the results.
- To reach non trivial conclusions of significant of the experiments.

ENGINEERING PHYSICS LAB
COURSE OUTCOME
After the completion of the experiments in physics lab, students gain

- Skills on measurements
- Knowledge to design
- Plan the experimental procedure
- To record and process the results
- Ability to analyze the results

LIST OF EXPERIMENTS

1. **P.O.Box – energy gap of a semiconductor**
   To find the band gap of the given thermostat using post office box.

2. **Lee's Disc**
   To determine the thermal conductivity of the bad conductor by Lee's Disc method.

3. **Diffraction Grating – Spectrometer**
   To find the wavelengths of the prominent spectral lines in the mercury (Hg) source.

4. **Viscosity of Liquids**
   To determine the co-efficient of viscosity of the given liquid (water) by Poiseuille's method.

5. **Thermo emf by potentiometer**
   To find the E.M.F of the given thermocouple using a potentiometer

6. **Young's Modulus – uniform bending**
   To determine Young's modulus of the material of the beam by uniform bending method.

U2GEB18 COMMUNICATION SKILLS LABORATORY L T P C
0 0 3 2

COURSE OBJECTIVES

- To impart advanced skills of Technical Communication in English through Language Lab
- To enable the students to communicate confidently and competently in English Language in all spheres
- To familiarize the students with the sounds of English in a nutshell, particularly stress and intonation

COURSE OUTCOME

After the completion of the experiments in English lab, students will

- Able to pronounce words correctly
- Acquire knowledge in Phonetics
- Enrich vocabulary
- Enhance speaking skills
- Build sentences without errors

UNIT I LISTENING COMPREHENSION: (9)

Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions

UNIT II READING COMPREHENSION: (9)

Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

UNIT III SPEAKING: (9)

PC based session -Phonetics: Intonation – Ear training -Correct Pronunciation – Sound recognition Exercises – Common Errors in English-Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation) - Viewing and discussing audio-visual materials (Samples are available to learn and practice)

UNIT IV RESUME / REPORT PREPARATION / LETTER WRITING (9)

Structuring the resume / report -Letter writing / Email Communication -Samples.

UNIT V SOFT SKILLS: (9)

Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity -Stress Management & Poise -Video Samples.

B.TECH – ELECTRONICS AND COMMUNICATION ENGINEERING
Curriculum &Syllabus [Regulation BR (2014)](2014-15 Batch only)

SEMESTER I

Course Code	Course Name	L	T	P	C
THEORY					
U1GEB20	Engineering English - I	2	0	0	2
U1GEB21	Engineering Mathematics - I	3	1	0	4
U1GEB22	Engineering Physics - I	2	0	0	2
U1GEB23	Engineering Chemistry - I	2	0	0	2
U1GEB24	Principles of Electrical and Electronics Engineering	3	0	0	3
U1GEB25	Basics of Computing and C Programming	3	0	0	3
PRACTICAL					
U1GEB26	Engineering Physics and Chemistry Laboratory - I	0	0	4	2
U1GEB27	Principles of Electrical and Electronics Engineering Laboratory	0	0	3	2
U1GEB28	Computer Practices laboratory	0	0	3	2
Total		15	1	10	22

SEMESTER II

Course Code	Course Name	L	T	P	C
THEORY					
U2GEB29	Engineering English-II	2	0	0	2
U2GEB30	Engineering Mathematics –II	3	1	0	4
U2GEB31	Engineering Physics – II	2	0	0	2
U2GEB32	Engineering Chemistry – II	2	0	0	2
U2GEB33	Basics of Mechanical and Civil Engineering	3	0	0	3
U2GEB34	Engineering Graphics	3	1	0	4
PRACTICAL					
U2GEB37	Engineering Practice Lab	0	0	3	2
U2GEB35	Engineering Physics & Chemistry Laboratory-II	0	0	4	2
U2GEB36	Proficiency in English Lab - I	0	0	3	2
U2GEB38	Life Skills	1	0	0	1
Total		16	2	10	24

SEMESTER I

Course Code	Course Name	L	T	P	C
THEORY					
U1GEB20	Engineering English - I	2	0	0	2
U1GEB21	Engineering Mathematics - I	3	1	0	4
U1GEB22	Engineering Physics - I	2	0	0	2
U1GEB23	Engineering Chemistry - I	2	0	0	2
U1GEB24	Principles of Electrical and Electronics Engineering	3	0	0	3
U1GEB25	Basics of Computing and C Programming	3	0	0	3
PRACTICAL					
U1GEB26	Engineering Physics and Chemistry Laboratory - I	0	0	4	2
U1GEB27	Principles of Electrical and Electronics Engineering Laboratory	0	0	3	2
U1GEB28	Computer Practices laboratory	0	0	3	2
Total		15	1	10	22

COURSE CODE: U1GEB20
COURSE NAME: ENGINEERING ENGLISH I

L	T	P	C
2	0	0	2

COURSE OBJECTIVES

Students undergoing this course are expected:

- To develop their basic communication skills in English
- To achieve specific linguistic and communicative competence
- To acquire relevant skills and function efficiently in a realistic working context
- To inculcate the habit of reading for pleasure

COURSE OUTCOMES

On successful completion of this course, students will be able to:

- Respond orally to the written works, grounding their ideas in the text.
- Formulate open-ended questions in order to explore a topic of interest
- Training to adhere in analytical and critical dialogue orally
- Engage in daily, meaningful reading tasks in English class and/or at home.
- Develop interpersonal skills on current problems and events

PRE-REQUISITES

Admission to B.Tech.Programme

COURSE CONTENTS

UNIT I TECHNICAL GRAMMAR **9**

Parts of Speech, Time, Tense and Aspect, Active and Passive Voice, WH Questions, Question Tag-Concord.

UNIT II INFORMATION SKILLS **9**

Letter writing, Formal and Informal letters, Transformation of information and Transcoding (Pie chart, bar chart & classification table), Process Description, Note taking, Note Making,Paragraph Writing

UNIT III LANGUAGE OUTLINE **9**

Definitions and Extended Definitions, Hints Development, Checklist, Dialogue Writing, Report, its importance and Report Writing

UNIT IV LANGUAGE SKILLS **9**

Process of Communication and factors, Verbal and Non-verbal Communication, Listening Skills, Reading Skills, Speaking skills, Writing skills

UNIT V INTUITION SKILLS **9**

Creative thinking, Critical thinking, Discussion of current affairs and events and problems, Offering suggestions/ solutions/ sharing opinions.

TOTAL: 45 periods

TEXT BOOKS

1. Andera, J.Rutherford. Basic Communication Skills for Technology, Second edition, Pearson Education,2007

2. Butterfield, Jeff. Soft Skills for Everyone, Cegage learning, Canada,2011

REFERENCE BOOKSS

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. New York: Rutledge, 2011.
2. Morgan, David and Nicholas Regan. Take-Off: Technical English for Engineering. Garnet Publishing Limited. New York: Longman, 2008.
3. Ganesan. S, Persis Mary T &Subhashini.B. Communication in English, Himalaya Publishing House, Mumbai, 2009.
4. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. Technical English: Writing, Reading and Speaking. New York: Longman, 2009.

COURSE CODE: U1GEB21
COURSE NAME: ENGINEERING MATHEMATICS-I

L	T	P	C
3	1	0	4

COURSE OBJECTIVES

- To develop the basic mathematical knowledge and computational skills of the students in the areas of applied mathematics.
- To develop the skills of the students in the areas of several variable Calculus, Matrices, and sequences and series.
- To serve as a pre-requisite mathematics course for post graduate courses, specialized studies and research.

COURSE OUTCOMES

On successful completion of this course students will be able to:

- Calculate eigen-values and eigen-vectors, apply Caley-Hamilton theorem, and diagonalize of symmetric matrices and demonstrate the nature of quadratic forms.
- Discuss the convergence and divergence of sequence and series of real numbers using various tests.
- Demonstrate understanding of the derivatives of functions of several variables, viz., partial and total differentiation, and differentiation of implicit functions and optimize the functions of several variables using Hessian method and Lagrangian method.
- Evaluate double integration and triple integration using Cartesian, polar co-ordinates and the concept of Jacobian of transformation from one coordinate system to another coordinate system.
- Identify the improperness in integrals and evaluate the integrals using appropriate mathematical tools and how to apply beta and gamma integrals keeping improperness in mind.

PRE-REQUISITES

Admission to B.Tech. Programme

COURSE CONTENTS

UNIT I MATRICES **L- 9 + T-3**

Characteristic equation – Eigen-values and Eigen-vectors of a real matrix – Statement of Cayley- Hamilton theorem – Applications of Cayley-Hamilton theorem in finding the inverse of a non-singular matrix and the power of a square matrix – Diagonalization of symmetric matrices – Nature of Quadratic forms

UNIT II SEQUENCES AND SERIES **L- 9 + T-3**

Sequences – Convergence of series – Series of positive terms – Tests for convergence (n-th term, ratio, comparison, root and integral tests) and divergence - Leibnitz test for alternating series –Series of positive and negative terms - Absolute and conditional convergence– Power series – Taylor and Maclaurin series

UNIT III DIFFERENTIAL CALCULUS OF SEVERAL VARABLES L- 9 + T-3

Limits and continuity- Partial Derivatives – Total derivative – Differentiation of implicit functions – inverse functions – Jacobian – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers

UNIT IV INTEGRAL CALCULUS OF SEVERAL VARIABLES L- 9 + T-3

Double integrals- Change of order of integration – Double integrals in polar coordinates – Triple integrals – Area as a double integral – Volume as a triple integral

UNIT V IMPROPER INTEGRALS L- 9 + T-3

Meaning of improper integrals - Beta and Gamma functions – properties –Reduction formula for

Γ(n) – Relation between gamma and beta functions - Evaluation of integrals using Beta and gamma functions – simple problems. **TOTAL: 45+15(Tutorial) = 60 periods**

TEXT BOOKS

1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers, New Delhi, 41st Edition, 2011.
2. Jain R.K and Iyengar, S.R.K *Advanced Engineering Mathematics*, 3rd edition, Narosa Publishing House, 2009.

REFERENCE BOOKS

1. Adrian Banner. *The Calculus Lifesaver*, Princeton University Press, Princeton, USA, 2007.
2. Alan Jeffrey. *Advanced Engineering Mathematics*, Harcourt/Academic Press, New York, 2002.
3. Hyghes-Hallett, Gleason, McCallum et al. *Single Variable Calculus* (6th Edn) John Wiley and Sons New York, 2013.
4. Hyghes-Hallett, Gleason, McCallum et al. *Multivariable Variable Calculus* (6th Edn) John Wiley and Sons New York, 2013.
5. Dennis G. Zill , Warren S. Wright and Michael R.Cullen. *Advanced Engineering Mathematics* (4th Edn) Jones a& Bartlett Learning, Canada, 2011.
6. James Stewart. *Multivariate Calculus, Concepts and Contexts*. (3rd Edn) Thomson/Brooks/Cole, Canada, 2005.
7. John Bird. *Higher Engineering Mathematics*, (5th Edn) Elsevier , Burlington,USA, 2006.
8. K.A.Stroud and D.J.Booth. *Advanced Engineering Mathematics* (4th Edn) Palgrave/MacMillan, USA. 2003.
9. Soo T. Tan. *Single Variable Calculus*, Brooks/Cole, Cengage Learning, Belmont, USA, 2010.
10. Soo T. Tan. *Multivariable Calculus*, Brooks/Cole, Cengage Learning, Belmont, USA, 2010.
11. Duraipandian P, Udayabaskaran S and Karthikeyan T, *Engineering Mathematics* (I Year) Muhil Publishers, 2010.
12. Kreyszig, E. *Advanced Engineering Mathematics*, (9th Edn.), John Wiley and sons, New York 2005.
13. Peter O' Neil, *Advanced Engineering Mathematics*, Cengage Learning, Boston, USA, 2012.

COURSE CODE: U1GEB22
COURSE NAME: ENGINEERING PHYSICS – I

L	T	P	C
2	0	0	2

COURSE OBJECTIVES

- To understand the basic laws of physics and their applications in engineering and technology.
- To develop scientific temper and analytical capability.
- To solve various engineering problems.

COURSE OUTCOMES

On successful completion of this course students will be able to:

1. Discuss the basic physics concepts and its applications in a day to day life; demonstrate the knowledge in ultrasonic applications and its importance.
2. Identify information to relate and apply the utilizations of the electron beams in modern technologies such as CRT, CRO etc.
3. Explain the basic understandings of the matter, crystal structure and its fundamental properties including crystal systems, Miller indices, and X-Ray production.
4. Demonstrate the conductivity nature of metals and the classification of the solids learned from The Band Theory of Solids.
5. Identify the importance of the widely used current technologies such as mobile phones, solar cells for which semiconductor technology is essential.

PRE-REQUISITES

Admission to B.Tech. Programme

COURSE CONTENTS

UNIT-I: Acoustics **9**

Introduction, sound waves - Pitch and Intensity. Reflection of sound waves, Sabine formula, absorption of sound, reverberation Theory. Ultrasonic's –Acoustic Grating – production - magnetostriction oscillator and piezoelectric oscillator, Properties and applications

UNIT -II: Electron Optics **9**

Introduction, Electron-refraction-Bethe's law, Electron Gun and Electron Lens, Cathode Ray Tube and Cathode Ray Oscilloscope, Cyclotron, Bainbridge Mass Spectrograph, Electron Microscope, Applications.

UNIT -III: Crystal structures and X-Rays **9**

Introduction, Space lattice, unit cell, lattice parameters, Bravais Lattice - Crystal systems. Characteristics of Unit cell. Miller indices of planes. X-Rays –production, Bragg's Law. Powder crystal method and rotating crystal method.

UNIT -IV: Band Theory of Solids **9**

Introduction, Electrical conduction, conductivity, drift velocity, influence of external factors on conductivity. The Band Theory of solids, Energy Bands, Energy Gap. Classification of solids, Energy Band structure of a conductor.Fermi-Dirac distribution function and Fermi Energy. Energy Band structure of an Insulator and semiconductor.

UNIT -V: Semiconductors **9**

Introduction, Types- Intrinsic and Extrinsic semiconductors. Intrinsic carriers-electron and hole concentrations. Fermi level in intrinsic carrier density, Conductivity, Doping of impurities-N-type and P-Type.Temperature variation-law of mass action-Charge neutrality condition- Fermi level in extrinsic semiconductor-Hall effect-Applications.

TOTAL: 45 periods

TEXT BOOKS

1. M.N. Avadhanulu and P.G. Kshirsagar ,A Text Book of Engineering Physics, S.CHAND and Co, 2012.
2. Gaur and Gupta, Engineering Physics , DhanpatRai publications, 2009

REFERENCE BOOKS

7. S.O.Pillai ,Solid State Physics,New age international publications, 2010.
8. M.Arumugam, Engineering Physics,Anuradha publications, 2009.
9. Charles Kittel ,Introduction to Solid State Physics ,Wiley India publications, 2009.
10. Introduction to Solids –L.Azaroff TMH,33rd Reprint 2009.
11. Materials Science and Engineering – William Calister – Wiley India- Sixth Edition 2009.

COURSE CODE: U1GEB23
Name of the Course: ENGINEERING CHEMISTRY-I

L	T	P	C
2	0	0	2

COURSE OBJECTIVES

Students undergoing this course are expected to be conversant with:

1. A sound knowledge on the principles of chemistry and its applications in industries as well as research oriented topics useful for project submision of all branches of engineering.
2. Various aspects and principles of water treatment, surface chemistry, fuels and combustion along with preparation and application of important engineering materials and polymers.
3. Development of scientific approach towards solving time bound theoretical and experimental problems and ability to work in a team both as members and leaders.

COURSE OUTCOMES

After completing first semester, students from all branches of engineering will:

1. Demonstrate knowledge on the design of boilers, conditioning methods and the various treatments of water for public use.
2. Demonstrate knowledge concerned with the various industrial applications of adsorption techniques.
3. Describe various aspects related to Engineering polymers and their application in industries, chemical compositions and uses.
4. Describe Engineering materials and their significance in the present day life.
5. Demonstrate knowledge on fuels, their manufacturing and analysis.

PRE-REQUISITES

Admission to B.Tech. Programme

COURSE CONTENTS

UNIT- I WATER TREATMENT AND TECHNOLOGY 9

Introduction- Hardness-Types and estimation by EDTA method-Boiler feed water – requirements- disadvantages of using hard water in boilers- internal conditioning (phosphate, calgon and carbonate conditioning methods)-external conditioning method-demineralization process – desalination-reverse osmosis –Electrodialysis- Domestic water treatment.

UNIT–II SURFACE CHEMISTRY 9

Introduction-types of adsorption-adsorption of gases on solids, solute from solution-adsorption isotherm- Freundlich and Langmuir adsorption isotherm- BET basics and industrial applications. Role of adsorbent in catalysis- ion exchange reaction-chromatography – role of activated carbon in pollution abatement of air and waste water-Industrial applications of adsorption

UNIT–III POLYMERS 9

Polymer, Classification based on, origin, structure, chemical structure, Degree of polymerization - Types of polymerization – Thermosetting and Thermoplastic polymers and their applications- Molecular weight of the polymer-Number average, weight average by viscosity method.Glass transition temperature-Conducting polymer and Biopolymers-Polymeric composites.

UNIT–IV MATERIALS CHEMISTRY **9**

Abrasives-Classification and properties, Refractories-Classification and properties, Lubricants- Classification and properties. Organic electronic materials-liquid crystals, non-linear optics and LED, Nano materials-Buckminister fullerenes, CNT'S(Single walled carbon nano tubes and Multi-walled carbon tubes), advantages and applications-Nano composites

UNIT–V FUEL AND COMBUSTION CHEMISTRY **9**

Classification, Characteristics of fuel, Comparison between Solid, liquid and gaseous fuels, Combustion processes-Bomb calorimeter -Calorific value: gross and net calorific values.Solid Fuels: Coal: Classification, Analysis: Proximate and Ultimate analysis of coal and their importance, Metallurgical coke: Properties, Manufacture by Otto Hoffman process. Synthetic Petrol: Fischer-Tropsch process and Bergius Process, Knocking and chemical structure, octane number and cetane number and their significance, Gaseous Fuels: Natural gas, artificial gas (water gas, producer gas, coal gas). Flue gas analysis – Orsat apparatus.

TOTAL: 45 periods

TEXT BOOKS

1. P.C.Jain and Monica Jain - "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi (2002).
2. S.S.Dara- "A Text book of Engineering Chemistry" S.Chand&Co.Ltd., New Delhi (2006).
3. A. Ravikrishnan– Engineering Chemistry, Sri Krishna Publication, Chennai.

REFERENCES BOOKS

1. B.K.Sharma - "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001)
2. B.Sivasankar - "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd. New Delhi (2008).
3. B.R.Puri, L.R. Sharma, S.Pathania - "Principles of physical Chemistry" (2000).

COURSE CODE: U1GEB24
COURSE NAME: PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To make students understand about the basic laws, concepts and allied terminologies pertaining to D.C Circuits & magnetic circuits
- To impart knowledge to students regarding the fundamentals of alternating current Rules and associated terminologies and it's behavior with fundamental elements like resistance inductance and capacitance**.**
- To make student familiarize about the various basic ac & dc rotating machines and transformers.
- To make students familiarize about the basic knowledge in state solid electronic devices and digital logic gates.
- To make students aware about fundamental principles underlying the working of various communication systems, modulation procedure and spectral bands.

COURSE OUTCOMES

On successful completion of this course students will be able to:

- Enumerate the basics of electric circuit elements , related terminologies and fundamental laws governing the operation and analysis of those circuits with DC sources and laws , and also concepts related to magnetic circuits.
- Develop knowledge about the concept of single phase alternating current ,it's generation and circuit behavior with basic elements like resistance, inductance, & capacitance.
- Cite the operating principles and identify various ac, dc machines and transformers.
- Illustrate common solid state devices & and access their characteristic and explain the basic of logic gates.
- Correlate & summarize the fundaments concepts behind electronic communication systems.

PRE-REQUISITES

Admission to B.Tech. Programme

COURSE CONTENTS

UNIT I - D.C.CIRCUITS &MAGNETIC CIRCUITS **9**

Electrical quantities, Ohm's Law, Series and parallel combinations, Kirchhoff's laws, Node and Mesh Analysis - Star - Delta Transformation-Definition of MMF, Flux and reluctance – Leakage factor - Reluctances in series and parallel (series and parallel magnetic circuits) - Electromagnetic induction - Fleming's rule - Lenz's law - Faraday's laws

UNIT II - A.C.CIRCUITS **9**

Sinusoidal functions - RMS (effective) and Average values- Phasor representation - J operator – sinusoidal excitation applied to purely resistive, inductive and capacitive circuits - RL, RC and RLC circuits- Introduction to three phase circuits.

UNIT III –ELECTRICAL MACHINES **9**

Definition of Electrical Machines-Principle and Operation Of Generator and Motor, types of DC and AC Machines, EMF equation of DC machines, Principle of Transformer, EMF equation of transformer-Principle of Induction Motor, Synchronous Motor

UNIT IV - BASIC ANALOG AND DIGITAL ELECTRONICS **9**

PN junction Diode - Rectifiers - Half wave and full wave rectifiers, Bipolar Junction Transistor - Characteristic of FET, MOSFET, Silicon Controlled Rectifiers and Triac - Basic Logic Gates- Universal Logic Gates

UNIT V - BASIC COMMUNICATION SYSTEMS **9**

Basic Communication systems- Advantages of digital system- Elements of communication system - Electromagnetic spectrum - Modulation concepts. **TOTAL: 45 periods**

TEXT BOOKS

1. Mittle.B.N, AravindMittle, "Basic Electrical Engineering", Tata McGraw Hill", 2nd Edition. Sep 2005.
2. Theraja.B.L, "Fundamentals of Electrical Engineering and Electronics", S.Chand& Co., 1st Multicolor Edition, 2006 (Reprint 2009).
3. Sedha.R.S, A Text book of Applied electronics, 2nd Edition, S.Chand& company, 2005.
4. Bhattacharya.S.K and Renuvig, Principles of electronics, 3rd Edition, S.K.Kataria& Sons, 2002.

REFERENCE BOOKS

1. Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Learning Private Ltd, 2nd Edition, 2010.
2. Wadhwa.C.L, "Basic Electrical Engineering", New Age International, 4th Edition, 2007. (Reprint June 2010)
3. AbhijitChakrabarti, SudiptaNath&Chandan Kumar Chanda, "Basic Electrical Engineering", Tata McGraw Hill, 1st Edition, 2009.
4. T. Thyagarajan, ―Fundamentals of Electrical Engineering, SciTech Publications, 5th Edition, Reprint Jan 2010.

U1GEB25 BASICS OF COMPUTERS AND C PROGRAMMING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

Students undergoing this course are expected to:

- Learn the fundamentals of computer and information technology
- Learn the Problem solving techniques
- Learn the basics and syntax of C programming.
- Learn the basics of UNIX and LINUX

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Describe the computer hardware and software and Internet terminologies	K2
CO2	Explain the different methods of problem solving skills	K2
CO3	Discuss the algorithm, pseudo code, flow chart for simple problems	K2
CO4	Write an expression using operators and explain the decision making in C	K2
CO5	Explain the syntax of Array, Function, Structure and Union in c	K2
CO6	Describe the concept of pointer and files	K2
CO7	Explain the concepts of UNIX and LINUX	K2
CO8	Apply the C programming concept to solve real world problems	K3

PRE REQUISITE

Higher Secondary Level Mathematics

COURSE CONTENTS

UNIT I BASICS OF COMPUTER AND INFORMATION TECHNOLOGY 10

Digital Computer Fundamentals–Block diagram of a computer–Components of a computer system–Applications of Computers–Hardware and Software definitions–Categories of Software–Booting–Installing and uninstalling Software–Software piracy–Software terminologies-Information Technology Basics–History of Internet–Internet Tools.

UNIT II PROBLEM SOLVING METHODOLOGY 8

Problem solving Techniques–Program–Program development cycle–Algorithm – Flow chart – Pseudo Code – Program control structures – Types and generation of programming languages – Development of algorithms for simple problems.

UNIT III INTRODUCTION TO C 9

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operations – Decision Making - Branching and Looping.

UNIT-IV FUNCTIONS 9

Arrays- Character arrays and Strings - Defined Functions - Definition of Function– Declaration - Category of Functions - Nesting of Functions, Recursive, Structures and Unions, Enumeration and Typedef.

UNIT-V POINTERS, FILE MANAGEMENT AND OPERATING SYSTEM CONCEPTS 9

Pointers – File Management in C – Input / Output Operations on Files -The Preprocessor, Introduction to UNIX and LINUX programming.

Total: 45 Periods

TEXT BOOKS

1. Reema Thareja, Fundamentals of Computing & C Programming‖ Oxford University Press, 2012.
2. Ashok.N.Kamthane, Computer Programming‖, Fifth Edition Pearson Education, 2008.

REFERENCE BOOKS

1. P.Visu, R.Srinivasan and S.Koteeswaran, ―Fundamentals of Computing and Programming‖, Fourth Edition, Sri Krishna Publications, 2012.
2. E.Balagurusamy, ―Computing Fundamentals and C Programming‖, Tata McGraw-Hill,2008.
3. Richard Petersen, ―Linux: The Complete Reference‖, Sixth Edition, Tata McGraw-Hill,2007

L	T	P	C
0	0	4	2

COURSE CODE: U1GEB26
COURSE NAME: ENGINEERING PHYSICS AND CHEMISTRY LAB – I
ENGINEERING PHYSICS LAB – I
COURSE OBJECTIVES

- To impart skills in measurements and hand on operation
- To design and plan the experimental procedure and to record and process the results.
- To reach non trivial conclusions of significant of the experiments.

COURSE OUTCOMES
After the completion of the experiments in Physics lab, students will be able to

1. Relate and apply the moment of inertia of the disc.
2. Translate sensory input into physical tasks
3. Recognize standards to perform a skill or task correctly
4. Use standards to evaluate their own performance and make corrections.
5. Evaluate information based upon standards and criteria values.

COURSE CONTENTS

1. Torsional Pendulum
To determine the moment of inertia of the disc and the rigidity modulus of the wire by Torsional oscillations.

2. Newtons' Rings
To find the focal length of a lens by forming Newton's ring.

3. Laser Grating
(i) Determination of wavelength of Laser using Grating and Particle size determination
(ii) Determination of Numerical Aperture and Acceptance angle of an Optical Fibre

4. Ultrasonic Interferometer
Determination of Velocity of ultrasonic waves in a liquid and compressibility of the liquid.

5. Young's Modulus – Non-Uniform Bending
To determine Young's modulus of the material of the beam by Non uniform bending method.

U1GEB26 ENGINEERING CHEMISTRY LAB -1
COURSE OBJECTIVES
Students undergoing this course are expected to be conversant with basic titration set up and methodologies for determining strength, hardness and alkalinity of various unknown solutions and water samples.

COURSE OUTCOMES
After completing first semester, students from all branches of engineering will possess:

1. Gain acquaintance in the determination the amount of hardness and chloride in the various samples of water for general purpose and their use it industries involving boilers.
2. Skills in estimating acidity/alkalinity in given water samples.
3. Expertise in estimating dissolved oxygen in water samples.
4. Analytical skills in determining the molecular weight and degree of polymerization using Ostwald's viscometer.
5. Knowledge in quantitative analysis of the acid/base.

COURSE CONTENTS

LIST OF EXPERIMENTS

1. Estimation of hardness of Water by EDTA.
2. Determination of DO in water (Winkler's Method).
3. Estimation of Chloride in Water sample (Argentometric).
4. Conductometric precipitation titration using $BaCl_2$Vs Na_2 SO_4
5. Determination of molecular weight and degree of polymerization using Ostwald viscometer
6. Conductometric titration (mixture of acids and base).

Course Code: U1GEB27

Course Name: PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB

L	T	P	C
0	0	3	2

COURSE EDUCATIONAL OBJECTIVES

- To make students familiar about the various wiring methods and specific wiring like go down wiring.
- To make students familiar about practical measurements of few important electrical
- quantities
- To make students understand about basic electronic circuit components and their
- characteristics study
- To make students understand about the operation of CRO
- To make students understand about the various logic gates.

COURSE OUTCOMES

After successful completion of this course, students will be able to

1. Reenact various wiring methods and how to make wiring of a godown.
2. Understand what a resistive load is , and will be able to measure few electrical quantities like voltage , current and apply the skill in real life situations.
3. Discriminate & recognize basic electronic circuit components and their characteristics study
4. Check the operation of CRO
5. Distinguish the various logic gates.

PRE-REQUISITES

Basic Electrical & Electronics concept covered in higher secondary level.

COURSE CONTENT

LIST OF EXPERIMENTS: CYCLE I

1. Study of basic electrical and electronic components.
2. Godown Wiring
3. Stair case wiring
4. Fluorescent lamp wiring.
5. Measurement of Electrical quantities (Voltage, current, power) using load

MODEL PRACTICAL EXAMINATION I CYCLE II

1. Characteristics of PN junction Diode.
2. Characteristics of BJT (any one configuration).
3. Characteristics of zener diode.
4. Study of CRO.
5. Verification of logic gates

TEXT BOOK

1. Theraja.B.L, "Fundamentals of Electrical Engineering and Electronics", S.Chand& Co., 1st Multicolor Edition, 2006 (Reprint 2009). 2. Sedha.R.S, A Text book of Applied electronics, 2nd Edition, S.Chand& company, 2005.

REFERENCE BOOKS

1. Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Learning Private Ltd, 2nd g, 2010.

Course Code: U1GEB28
Course Name: COMPUTER PRACTICE LABORATORY

L	T	P	C
0	0	3	2

COURSE OBJECTIVES

Students undergoing this course will be provided with:

- The concept of MS Word and MS Excel.
- The concept of C control structures and Functions
- The concept of C pointers and file systems

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Develop a MS-Word document independently for the given requirements	K3,S3
CO2	Demonstrate usage of MS-Excel spread sheet independently for the given applications	K3,S3
CO3	Develop and implement the C program individually using control structures, arrays and string for the applications	K3, S3
CO4	Develop and implement the C program independently using pointers and files concept	K3, S3

PREREQUISITE

Higher Secondary Level Mathematics.

COURSE CONTENTS

1) Word Processing
   a. Document creation, Text manipulation with Scientific notations.
   b. Table creation, Table formatting and Conversion.
   c. Mail merge and Letter preparation.
   d. Drawing - flow Chart

2) Spread Sheet
   - Chart - Line, XY, Bar and Pie.
   - Formula - formula editor.
   - Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
   - S o r t i n g and Import / Export features

3. Find whether a given number is odd or even.
4. Find whether a given number is prime or not.
5. Design an arithmetic calculator using Switch-Case.
6. Find largest and smallest elements in an array.
7. Demonstrate Looping and Control structures.

8. Demonstrate the String functions.
9.Find a Factorial of a number of ranges between 1 to 41 using Recursive function.
10. Demonstrate the Structures and Unions for employee salary.
11. Perform pointer arithmetic Operations.
12. Program to develop student‘s information using file concept.

SEMESTER II

Course Code	Course Name	L	T	P	C
THEORY					
U2GEB29	Engineering English-II	2	0	0	2
U2GEB30	Engineering Mathematics –II	3	1	0	4
U2GEB31	Engineering Physics – II	2	0	0	2
U2GEB32	Engineering Chemistry – II	2	0	0	2
U2GEB33	Basics of Mechanical and Civil Engineering	3	0	0	3
U2GEB34	Engineering Graphics	3	1	0	4
PRACTICAL					
U2GEB37	Engineering Practice Lab	0	0	3	2
U2GEB35	Engineering Physics & Chemistry Laboratory-II	0	0	4	2
U2GEB36	Proficiency in English Lab - I	0	0	3	2
U2GEB38	Life Skills	1	0	0	1
Total		16	2	10	24

U2GEB29 ENGINEERING ENGLISH II

L	T	P	C
2	0	0	2

COURSE OBJECTIVES

Students undergoing this course are expected to:

- to build sentences without grammatical errors
- instill the competitiveness through presentation skills
- solve any critical situations using trouble shooting techniques
- encourage them to handle day -to-day tasks through soft skills
- inculcate the habit of reading for pleasure

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Apply the grammatical knowledge in writing any given topic	K3
CO2	Write technical reports effectively	K3
CO3	Describe group discussions, presentations and interview processes	K2
CO4	Speak confidently in seminars, one on one interaction among the peer groups	K4
CO5	Analyze articles on a given topic with the knowledge of vocabulary skills	K4

PRE REQUISITE

Engineering English I

COURSE CONTENTS

Unit I General grammar **6**

Simple Compound & Complex Sentences-Reported Speech- Modal verbs Articles

Unit II Technical Grammar **6**

Conditionals—'If' Clauses-Connectives- Word Formation-Nominal Compounds

Unit III Academic communication **6**

SMS Communications- Email Communications- CV and Cover letter-Mini Project Writing

Unit IV Corporate Communication **6**

Presentation Skills -Group Discussion-Interview Skills

Unit V Soft Skills **6**

Personality Development -Persuasive Speech- Dealing with clients -Time -Management -Crisis management -Trouble Shooting.

Total: 30 Periods

TEXT BOOKS:

1. Andera, J.Rutherford**. Basic Communication Skills for Technology,** Second edition, Pearson Education, New Delhi2007
2. Butterfield, Jeff. **Soft Skills for Everyone,** Cegage learning**,** Canada, 2011

REFERENCE BOOKS

1. Ganesan.S, et al, **Communication in English**. Himalaya publishing house, Mumbai, 2009.
2. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. **Technical English: Writing, Reading and Speaking.** New York: Longman, 2010.

U2GEB30 ENGINEERING MATHEMATICS – II

L	T	P	C
3	1	0	4

COURSE OBJECTIVES :

Students undergoing this course are expected to:

- Provide the knowledge of the areas of Vector Calculus, Integral Calculus, Complex variables, Laplace Transform and ordinary differential equations.
- Serve as a pre-requisite mathematics course for post graduate courses, specialized studies and research in any branch of engineering.

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Apply Laplace transformation techniques to convert time-domain complex systems into simple frequency-domain algebraic equations and vice-versa.	K3
CO2	Apply the method of undetermined coefficients, method of variation of parameters and Laplace transform techniques to solve ordinary linear differential equations.	K3
CO3	Apply vector calculus to solve problems related to vector and scalar fields.	K3
CO4	Apply analytical functions in conformal mapping problems.	K3
CO5	Apply the calculus of residues in contour integration.	K3

PREREQUISITE

Engineering Knowledge of the topics covered in Engineering mathematics- I; complex numbers; vector algebra.

COURSE CONTENTS

UNIT I LAPLACE TRANSFORM L-9 + T-3

Laplace transform – Sufficient Condition 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 - Inverse Laplace transform– Convolution theorem (excluding proof) – Initial and Final value theorems

UNIT II ORDINARY DIFFERENTIAL EQUATIONS L-9 +T-3

Introduction to higher order linear differential equations with constant coefficients –Method of undetermined coefficients - Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients – Solution of linear ODE of second order with constant coefficients using Laplace transform.

UNIT III VECTOR CALCULUS L-9 + T-3

Gradient, unit normal to surface- Directional derivative- Divergence and Curl — Irrotational and solenoidal vector fields – Introduction to vector integration – Green's theorem in a plane, Gauss divergence theorem, Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

UNIT IV ANALYTIC FUNCTIONS L-9 + T-3

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

UNIT V COMPLEX INTEGRATION L- 9 + T-3

Introduction to complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula (excluding proofs) – Taylor and Laurent expansions – Singular points – Residues – Residue theorem and simple problems – Application of residue theorem to evaluate real integrals –Unit circle and semi-circular contour(excluding poles on boundaries).

Total: 60 Periods

TEXT BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, (2011).
2. Kreyszig E, Advanced Engineering Mathematics, 12th edition, Wiley, 2010.

REFERENCE BOOKS

1. Dean G. Duffy. Advanced Engineering Mathematics with MATLAB, 2ndEdn. Chapman & Hall / CRC Press. New York, 2003 (Taylor and Francis, e-library, 2009).
2. Jain. R. K and. Iyengar, S.R.K, Advanced Engineering Mathematics, 3rd edition, Narosa Publishing House, 2009.
3. Peter O' Neil, Advanced Engineering Mathematics, Cengage Learning, Boston, USA, 2012.

U2GEB31 ENGINEERING PHYSICS II

L	T	P	C
2	0	0	2

COURSE OBJECTIVES:

Students undergoing this course are expected to:

- Explain the role of photons in understanding phenomena such as Compton effect, Dual nature of mater and Quantum Theory.
- Give an insight into the principle of Laser operation and applications of Optical fibers in instrumentation
- Understand theory and the principles behind various superconductivity and its characteristics and applications.
- Develop fundamental Knowledge of Magnetic and Dielectric Materials and relate to use in device design
- Have a well founded knowledge of the unique properties of materials with nanoscale dimensions and to learn the new applications of nano materials in nanotechnology

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Explain the wave-particle duality; concept of De-Broglie wavelength and its importance	K2
CO2	Discuss the property of Laser and optical fiber handling techniques and its application	K2
CO3	Discuss the superconducting phenomenon, their properties and concepts for various applications	K2
CO4	Differentiate various magnetic, dielectric materials for application in industries and medical field.	K2
CO5	Able to explain various methods involved in Synthesis of nano and smart materials through different techniques and their application in nano technology.	K2

PREREQUISITE

Basic theoretical knowledge in Atomic Physics, Lasers, Superconductivity, Electricity, Magnetism, and Engineering Physics I

COURSE CONTENTS

UNIT -I Atomic Physics 6

Black body radiation- ultraviolet catastrophe- Planck's Quantum hypothesis-Photoelectric effect- Measurement of K.E. of photoelectrons- stopping potential- Failures of Classical theory- Compton effect-Compton Theory-Dual nature of matter- DeBroglie Hypothesis-Davisson –Germer Experimen-, G.P. Thomson Experiment- Heisenberg's Uncertainty Principle (Statement only).

UNIT -II Lasers and Optical Fibers 6

Interaction of Radiation with Matter- Essentials of Laser-Types of Laser - Ruby Laser- He-Ne Laser- semiconductor Laser-Application of Lasers- Optical Fibers – Propagation of light through an optical fibers- Modes of Propagation- Types of optical fibers- Optical fiber communication system- Attenuation in fibers.

UNIT-III Superconductivity 6

Discovery of superconductivity- persistent currents- effect of external magnetic field- critical current density- Meissner effect- London penetration depth- BCS Theory descriptive- Type of superconductors- Josephson Effect (AC and DC) - Applications – Maglev-SQUIDS.

UNIT -IV Magnetic and Dielectric Materials 6

Magnetic Susceptibility-Magnetic materials (Dia, Para, Ferro & Antiferro)- Magnetic moment of atom-Hard and soft magnetic materials- Hysteresis curve – Applications. Dielectrics- Electronic, ionic, orientational and space polarizations – Internal fields in solids – Polarization-Induced dipoles-Nonpolar and Polar dielectrics - Clausius Mosotti equation-Dielectric loss.

UNIT -V Nanotechnology and Advanced Materials 6

Nano phase materials – Synthesis – Plasma arcing – chemical vapour deposition – Sol gel method – Electro deposition – Ball milling – properties and application – Carbon nano tubes – types. **Total: 30 Periods**

TEXT BOOKS

1. M.N.Avadhanulu and P.G.Kshirsagar ,A Text Book of Engineering Physics, S.CHAND and Co,2012.
2. Gaur and Gupta, Engineering Physics , Dhanpat Rai publications,2009

REFERENCE BOOKS

1. T.Pradeep, The essential understanding –Nanoscience and Nanotechnology-TMH, 2010.
2. William D.Callister ,Materials Science and Engineering, John Wiley &Sons- 2010
3. Charles Kittel ,Introduction to Solid State Physics -Wiley India publications,2009.

U2GEB32 ENGINEERING CHEMISTRY II

L	T	P	C
2	0	0	2

COURSE OBJECTIVES

Students undergoing this course are expected to:

- Impart a sound knowledge on the principles of chemistry involving the different application oriented topics.
- Impart adequate knowledge about the principles of electrochemistry, alloys, corrosion and energy storage devices along with the spectroscopic technique to analyze the chemical compounds.
- Prepare the students to solve problems in electrochemistry.

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Explain the phase rule and to appreciate the importance of alloys in the present day life.	K2
CO2	Explain the basic principles, laws of electrochemistry, solve simple problems and list various applications.	K2
CO3	Explain the various aspects of corrosion and its control	K2
CO4	Describe various energy sources and storage devices used in our daily life.	K2
CO5	Explain the basic principles of spectroscopic and microscopic techniques.	K2

PREREQUISITE

Engineering Chemistry I

COURSE CONTENTS

UNIT–I PHASE RULE AND ALLOYS 6

Statement and explanation of the terms involved- one component water system- condensed phase rule-construction of phase diagram by thermal analysis-simple eutectic systems (Lead-Silver system only)– Alloys - importance – ferrous alloys – Nichrome - stainless steel – non-ferrous alloys - brass and bronze.

UNIT–II ELECTROCHEMISTRY 6

Basics of conductance-Kohlarausch's Law-Effect of dilution-specific conductance and equivalence conductance. Electrochemical cells- reversible and irreversible cell- EMF measurement - single electrode potential- Nernst equation-problems-reference electrode-SHE-Calomel electrode-Glass electrode-measurement of p^H-electrochemical series-significance- potentiometric titration –Redox titration –conductometric titration.

UNIT–III CORROSION AND ITS CONTROL 6

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion

inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

UNIT–IV ENERGY SOURCES AND STORAGE DEVICES 6

Renewable and non renewable energy resources- nuclear fission- fusion-chain reaction-nuclear energy- nuclear reactor–light, heavy water nuclear power plant-Fast Breeder Reactor-wind energy- solar energy- tidal energy- primary and secondary batteries- lead acid- nickel cadmium-lithium ion battery-H_2-O_2 fuel cells.

UNIT–V SPECTROSCOPIC AND ANALYTICAL TECHNIQUES 6

Introduction- Electromagnetic radiation- interaction of electromagnetic radiation with matter-Beer- Lambert's law- principle, instrumentation(Block Diagram) and applications of UV-Visible spectroscopy, IR spectroscopy- colorimetry- flame photometry–AAS. Introduction to SEM and TEM.

TOTAL: 30 PERIODS

TEXT BOOKS

1. P.C.Jain and Monica Jain - "Engineering Chemistry" DhanpatRai Pub, Co., New Delhi (2008).
2. A. Ravikrishnan– Engineering Chemistry, Sri Krishna Publication, Chennai (2012).

REFERENCE BOOKS

1. B.K.Sharma - "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001)
2. B.Sivasankar - "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd. New Delhi (2008).
3. B.R.Puri, L.R.Sharma, S.Pathania - "Principles of physical Chemistry " (2000).
4. William Kemp – "Organic spectroscopy" Macmillan publications (1991).
5. Peter Atkins, Julio de Paula "Physical Chemistry" W.H. Freeman publications (2009)

U2GEB33 BASIC MECHANICAL AND CIVIL ENGINEERING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

Students undergoing this course are expected to:

- Understand the concept of manufacturing processes and basic mechanical engineering.
- Impart knowledge on fundamentals of civil engineering.

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Describe various manufacturing processes and working principle of power plant.	K2
CO2	Describe the working principles of combustion engines.	K2
CO3	Define the working principles of refrigeration and air conditioning systems.	K2
CO4	Explain the fundamentals of surveying and civil engineering materials.	K2
CO5	Describe building components and structures.	K2

PREREQUISITE

Engineering Practice Lab

COURSE CONTENTS

Unit I Manufacturing Processes and Introduction to Power plant 9

Introduction to Lathe – Drilling – Twist Drill Nomenclature – Shaper. Introduction to Metal Joining Processes - Welding processes - Arc & Gas welding - AC & DC welding equipments - Brazing and soldering. Introduction and classification of power plants – Working of thermal, hydroelectric and nuclear power plants.

Unit II Combustion Engines 9

Principle of Internal and external combustion engines – Petrol engine, diesel engine, working principle and comparison - Two stroke and four stroke of both CI & SI engines, working principle and comparison - Alternative fuels.

Unit III Refrigeration & Air-Conditioning System 9

Introduction to Refrigeration– Non cyclic & Cyclic Refrigeration - Principle of vapour compression refrigeration system - Applications. Air-Conditioning – Layout of typical domestic refrigerator – Window and Split type Air conditioner – Applications.

Unit IV surveying and civil engineering materials **9**

Surveying:

Introduction – Definition – Importance of surveying – Objectives of surveying – Principles of surveying – Types of surveying – Measurements of angles – Introduction to levelling – Types of levelling instruments.

Civil Engineering Materials:

Introduciton – Importance of civil engineering – construction materials – Bricks – Stones – Cement – Lime motor – Concrete.

Unit V Building Components and Structures **9**

Building Components:

Foundations – Objectives of foundations – Types of foundation – Requirements of good foundation.

Superstructure:

Introduction – Brick masonry – Masonry – RCC structure of members – Columns – Beams – Slabs – Lintels – Types of Roof – Trusses – Flooring – Roofing – Plastering. Components of bridges and dams.

TOTAL: 45 periods

TEXT BOOKS

1. P K Nag., - Basic Mechanical Engineering, Tata McGraw Hill Education, (2013).
2. K.V. Natarajan – Basic Civil Engineering, M/s Dhanalakshmi, Chennai - 2012

REFERENCE BOOKS

1. Rao P. N., Manufacturing Technology, 2nd Edition, Tata McGraw Hill Inc, New Delhi
2. Surendra Singh, ―Building Materials ", Vikas Publishing Company, New Delhi, 2006
3. Cambell J. S., Principles of Manufacturing Materials and Processes 14th Edition, Tata McGraw Hill, Inc, New Delhi, 2012

COURSE CODE: U2GEB34
COURSE NAME: ENGINEERING GRAPHICS

L	T	P	C
3	1	0	4

COURSE OBJECTIVES

- To familiarize the students in basic concept and necessity of conic sections, projections and developments of objects.
- To develop the imagination and drafting skills of students and let them understand the internal features of the object.

COURSE OUTCOMES

Students undergoing this course are able to

- Construct ellipse, parabola, hyperbola and draw free hand sketching of orthographic views.
- Construct orthographic projections of points, straight lines and planes.
- Construct projections of simple solids.
- Develop true sections and lateral surfaces of simple solids.
- Construct isometric and perspective projections of simple solids.

COURSE CONTENTS

UNIT I: CONIC SECTIONS AND FREE HAND SKETCHING 9+3

Construction of ellipse (concentric circle and eccentricity methods), construction of parabola (rectangle and eccentricity methods), construction of hyperbola (eccentricity method)

Free-hand sketching of orthographic views of pictorial views of solids – free-hand sketching of pictorial views of solids given the orthographic views.

UNIT II: PROJECTION OF POINTS, STRAIGHT LINES & PLANES 9+3

Orthographic projections of points, orthographic projections of straight lines located in the first quadrant only – determination of true lengths and true inclinations – orthographic projections of polygonal surface and circular lamina inclined to both reference planes.

UNIT III: PROJECTIONS OF SOLIDS 9+3

Projections of simple solids (prisms, pyramids, cylinder and cone) when the axis is inclined to one reference plane by change of position and change of reference line methods.

UNIT IV: SECTIONS OF SOLIDS & DEVELOPMENT OF SURFACES 9+3

Sections of solids (prisms, pyramids, cylinder and cone) in simple vertical position by using cutting plane inclined to one reference plane and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinder and cone – development of lateral surfaces of solids with cylindrical cutouts perpendicular to the axis.

UNIT V: ISOMETRIC & PERSPECTIVE PROJECTION 9+3

Principles of isometric projection - isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones – isometric view of combination of two simple solids. Perspective projection of prisms, pyramids and cylinder by visual ray method and vanishing points method.

TOTAL: 45+15(Tutorial) = 60 periods

TEXT BOOKS

1. K.V. Natarajan, A text Book of Engineering Graphics, Dhanalakshmi Publisher, Chennai – 42, 2009
2. Venugopal K. –Engineering Graphics, New Age International (P) Limited, 2002.

REFERENCE BOOKS

1. Warren J. Luzadder and Jon. M. Duff, - Fundamentals of Engineering Drawing, Prentice Hall of India Pvt., Ltd., Eleventh Edition, 2001.
2. B. Bhattacharyya, S.C. Bera, Engineering Graphics ., I.K. International Pvt Ltd., 2009
3. M.S. Kumar ., Engineering Graphics.,Dd Publications, 2008
4. Jeyapoovan.T., Vikas Publishing House Engineering Graphics with using Auto CAD,2007
5. BIS code: SP 46:2003 Engineering Drawing practice for Schools & Colleges.

U2GEB35 ENGINEERING PHYSICS AND CHEMISTRY LAB II

L	T	P	C
0	0	4	2

ENGINEERING PHYSICS LABORATORY II

COURSE OBJECTIVES

To impart skills for conducting experiments independently to determine,

- Band gap of a semi conductor
- Thermal conductivity of a bad conductor
- The wavelengths of different spectral lines derived from mercury vapor lamp and diffraction grating arrangement using normal incidence method.
- The Viscosity of a liquid by Poiseuille's method
- Young's modulus of the beam by Uniform Bending method

COURSE OUTCOMES

After the successful completion of the course in Engineering Physics lab -II, students will be able to individually and independently

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Conduct experiments independently to determine band gap of a semi conductor	K2,S3
CO2	Demonstrate the experiment independently to determine the thermal conductivity of a bad conductor.	K2,S3
CO3	Perform the diffraction grating experiment to determine the wavelength of spectral lines by mercury vapour lamp using normal incidence method	K2,S3
CO4	Calculate the Viscosity of a given liquid by conducting Poiseuille's experiment	K2,S3
CO5	Handle the travelling microscope to focus the pin and find the bending moment of a given beam practically	K2,S3

PREREQUISITE

It is necessary to have basic theoretical knowledge about semiconducting material, thermal conductivity, optic laws, viscosity and bending moment of the beam.

COURSE CONTENTS

1. **Band Gap**
   To determine the Band gap of a Semiconductor material by using Post office Box
2. **Lee' Disc**
   To determine the thermal conductivity of the bad conductor – Lee's Disc method
3. **Spectrometer Mercury lamp**
   To determine the wavelengths of different spectral lines derived from mercury vapor lamp using normal incidence method.
4. **Viscosity**
   To determine the Viscosity of a liquid by Poiseuille's method

5. **Young's Modulus – Non-Uniform Bending**
   To determine of young's modulus of the beam – Uniform Bending

U2GEB35 ENGINEERING PHYSICS AND CHEMISTRY LAB II

ENGINEERING CHEMISTRY LABORATORY II

COURSE OBJECTIVES

Students undergoing this course are expected to be conversant with basic knowledge about handling various instruments like conductometer, potentiometer and pH meter and determining strength of various unknown solutions using the same.

COURSE OUTCOMES

After completing first semester, students from all branches of engineering will possess:

CO Nos.	**Course Outcomes**	**Level of learning domain (Based on revised Bloom's)**
CO1	Perform an experiment to estimate the amount of Copper in brass by EDTA titration method	K2, S3
CO2	Carry out Conductometric titration (Mixture of weak and strong acids Vs Strong base).	K2, S3
CO3	Perform Conductometric precipitation titration using $BaCl_2$Vs $Na_2\ SO_4$	K2, S3
CO4	Perform Potentiometric Titration (Fe^{2+} Vs $KMnO_4$ or $K_2Cr_2O_7$).	K2, S3
CO5	Perform and estimate the strength of HCl by pH meter (acid Vs base)	K2,S3
CO6	Perform the experiment using Spectrophotometer for estimationof Ferric iron	K2,S3

PREREQUISITE

Engineering Chemistry Laboratory-I.

CONTENTS

1. Estimation of Copper in brass by EDTA
2. Conductometric titration (Mixture of weak and strong acids Vs Strong base).
3. Conductometric precipitation titration using $BaCl_2$Vs $Na_2\ SO_4$
4. Potentiometric Titration (Fe^{2+} Vs $KMnO_4$ or $K_2Cr_2O_7$).
5. Determination of strength of HCl by pH meter (acid Vs base).
6. Estimationof Ferric iron by spectrophotometric method.

U2GEB36 PROFICIENCY IN ENGLISH LABORATORY I

L	T	P	C
0	0	3	2

COURSE OBJECTIVES

- To impart advanced skills of Technical Communication in English through Language Lab
- To enable the students to communicate confidently and competently in English Language in all spheres
- To familiarize the students with the sounds of English in a nutshell, particularly stress and intonation
- To enable the students to communicate in English language in all spheres

COURSE OUTCOMES

After the successful completion of this course students will be able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Pave a platform to understand the sounds of English language	K3
CO2	Use their vocabulary in framing sentences and statements	K5
CO3	Formulate open-ended questions in order to explore a topic of interest	K5
CO4	Engage themselves in Group Discussions and Presentation skills	K5
CO5	Embolden in public speaking and to affluent one on one interaction	K5

PREREQUISITE

Engineering English I.

CONTENTS

CYCLE-I

1. Phonetics
2. Rearranging the words into meaningful sentences
3. Find the Odd words out
4. Creative writing
5. Find out the word meanings
6. Find out different meanings with the help of prefixes and suffixes
7. Word Analogy
8. Spotting the errors

CYCLE –II

1. Extempore speech
2. Group Discussion
3. How to write a story with the visual
4. Presentation-1(Technical)
5. Presentation-2(Non- Technical)
6. Mock interviews

COURSE CODE: U2GEB37
COURSE NAME: ENGINEERING PRACTICE LABORATORY

L	T	P	C
0	0	3	2

COURSE OBJECTIVES

To educate the students in

- Plumbing tools – house hold plumbing fittings and Carpentry process – Carpentry tools, types of joints.
- Types of welding & tools.
- Types of machining and operations, machine tools, cutting tools (Lathe, Drilling).
- Sheet metal – definition, working tools, operations - forming & bending.

COURSE OUTCOMES

Students undergoing this course are able to

- Produce simple joints using arc and gas welding processes.
- Display skills to perform basic machining and sheet metal operations.
- Display skills to work in a team environment.
- Prepare simple plumbing line sketches and models for house hold pipe fittings.
- Exhibit simple carpentry skills using power tools.

COURSE CONTENTS

I CIVIL ENGINEERING PRACTICE

Plumbing Works:

a) Preparation of plumbing line sketches for
   i. Water supply line
   ii. Sewage works.

b) Basic pipe connections using valves, taps, couplings, unions, reducers, elbows and in house hold fitting.

Carpentry using Power Tools:

(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise: Power sawing, Power Planning and making various joints.

II MECHANICAL ENGINEERING PRACTICE

Welding:

(a) Arc welding practice – butt joints and lap joints.
(b) Gas welding practice – butt joints and lap joints.

Basic Machining:

(a) Simple Turning and Taper turning in lathe.
(b) Drilling Practice.

Sheet Metal Work:

(a) Forming & Bending:
(b) Model making – Trays, funnels, etc.

U2GEB38 LIFE SKILLS

L	T	P	C
1	0	0	1

COURSE OBJECTIVES

Students undergoing this course are expected to:

- Have an overview of core life skills and emotional intelligence for day to day management.
- Provide an outline of personal values and time management principles for success in life.
- Expose students to the significance of interpersonal relationships and techniques to maintain them.
- Provide an overview of the role of stress and its impact on individual behaviour and the techniques to manage them.
- Expose students to the process of decision making and its implementation.

COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Identify the core life skills and its implementation in career and development	A1, K2
CO2	Interpret the personal values and its importance for self-management	A1, K2
CO3	Show appropriate interpersonal skills required for effective management of life skills	A2, K2
CO4	Recognize the various causes and impacts of stress and the ways of coping with it	A3, K2
CO5	Display decision-making abilities for conflict resolution in daily life	A5, K2

PRE-REQUISITES

Basic awareness about self and interpersonal skills

COURSE CONTENTS

UNIT I INTRODUCTION TO LIFE SKILLS 3

Definition- Concept of Life Skills, Practical use of core skills in daily life - Definition of Emotional Intelligence- Knowing one's Emotions and Managing Emotions.

UNIT II BEHAVIOUR AND VALUES 3

Personal Values- Strengths- Self-confidence, self-assessment, self-reliance, self-discipline, determination, self-restraint, contentment, humility, compassion, gratitude, forgiveness. Social Responsibility - Time Management- Value of time, Weekly Planner to do list

UNIT III INTERPERSONAL SKILLS 3

Maintaining Interpersonal Relationships- Relationship with family and peers - Prosocial behaviour- Helping others, Motivation to help others-Empathy - Displaying optimism and enthusiasm.

UNIT IV STRESS MANAGEMENT 3

Definition of Stress- Causes of stress and its impact. Stress Management techniques Managing Emotions- Anger Management- Causes of aggression- Thinking and Behaving in a Positive way Sensitization to Substance Abuse

UNIT V DECISION MAKING AND PROBLEM SOLVING 3

Definition- Decision making. Necessity of Decision Making-Process of Decision Making Developing Alternatives, Evaluating Options, Implementing - Resolving Conflict- Steps for Conflict Resolution **Total: 15 Periods**

TEXT BOOKS

1. Rajasekaran, G; Nair, Radhakrishnan, and Santhanam, Divya (Edtd) (2009); Facilitator's Manual on Enhancing Life Skill; Chennai, Rajiv Gandhi National Institute of Youth Development
2. Butterfield, Jeff (2010); Soft Skills for Everyone; Delhi: Cengage Learning India Private Ltd

REFERENCE BOOKS

1. Goleman, Daniel (1995); Emotional Intelligence: Why It Can Matter More Than IQ; Bantam Books.
2. Baron, Robert A; Byrne, Donn and Branscombe, Nyla R. (2006); Social Psychology; New Delhi: Pearson Education.

B.TECH

ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum & Syllabus
Regulation 2013

SEMESTER – III
[Regular]

THEORY AND LAB COURSES

B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum [Regulation 2013]

SEMESTER – III

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U3MAB01	Transforms and Partial Differential Equations	3	1	0	4
U3ECB01	Semiconductor Devices and Circuits	3	1	0	4
U3ECB02	Digital System Design	3	1	0	4
U3ECB03	Control System	3	1	0	4
U3CSB01	Data Structures & Algorithms	3	0	0	3
U3CEB13	Environmental Science and Engineering	3	0	0	3
PRACTICAL					
U3ECB04	Semiconductor Devices and Circuits Lab	0	0	3	2
U3ECB05	Digital System Design Lab	0	0	3	2
U3CSB05	Data Structure Lab	0	0	3	2
Total Credits					28

L – Lecture; T – Tutorial; P – Practical; C - Credit

Course Code: U3MAB01

L	T	P	C
3	1	0	4

Course Name: TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATION

COURSE OBJECTIVES

1. The course objective is to develop the skills of the students in the areas of boundary value problems and transform techniques.
2. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory.
3. The course will also serve as a prerequisite for post graduate and specialized studies and research.

COURSE OUTCOMES

On successful completion of this course students will be able to:

1. Understand the need for a function or its approximation as an infinite series (Fourier Series) to represent discontinuous function which occurs in signal processing and electrical circuits.
2. Demonstrate the use of Fourier Transform to connect the time domain and frequency domain.
3. Distinguish between ordinary differential equation, forming and solving PDEs.
4. Demonstrate understanding of basic concepts in application of partial differential equations in heat passing through rod, vibrating membrane, two dimensional heat conduction problems.
5. Demonstrate understanding Z-transform and analyzing Discrete signals by using Z-transform.

PRE-REQUISITE

Engineering Mathematics-I and Engineering Mathematics-II

LINKS TO OTHER COURSES

Fundamental to B.Tech. Courses.

COURSE CONTENT

UNIT I Fourier Series **9 + 3**

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 + 3**

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 + 3**

Formation of partial difference equations – solutions of standard types of first order partial differential equations– Lagrange's linear equation – linear partial differential equations of second and higher order with constant coefficients

UNIT IV Applications of Partial Differential Equations 9 + 3

Solutions of one dimensional wave equation – one dimensional equation of heat conduction – steady state solution of two-dimensional equation of heat conduction (insulated edges excluded) – Fourier series solutions in Cartesian coordinates only.

UNIT V Z-Transforms and Applications 9 + 3

Z-Transforms – elementary properties – inverse Z-transform – convolution theorem – formation of difference equations – solution of difference equations using Z-transform

BEYOND THE SYLLABUS

Classification of PDE and their Applications oriented problems in Engineering.

LEARNING RESOURCES

TEXT BOOKS

1. B.S. Grewal, *Higher Engineering Mathematics*, (41st Edn.), Khanna Publishers, New Delhi, 2012.
2. E. Kreyszig, *Advanced Engineering Mathematics*, (10th Edn.), John Wiley and Sons, New York, India, 2010.

REFERENCE BOOKS

1. R.K. Jain and S.R.K. Iyengar, *Advanced Engineering Mathematics,* (3rd Edn.), Narosa Publishing House, New Delhi, 2007.
2. H.K. Dass, *Advanced Engineering Mathematics*, (20th Edn.), S. Chand & Co, New Delhi, 2007.
3. E.C. Zachmanoglou and D.W. Thoe, *Introduction to Partial Differential Equations With Applications*, Dover, New York, 1986.
4. Brian Davies, *Integral Transforms and Their Applications*, Springer, 2001.
5. Alan Jeffrey. Advanced Engineering Mathematics, Harcourt/Academic Press, New York, 2002.

Online Resources

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

http://www.fourier-series.com/
http://www.sosmath.com/fourier/fourier1/fourier1.html
http://www.efunda.com/math/fourier_transform/index.cfm
http://ocw.usu.edu/civil_and_environmental_engineering/numerical_methods_in_civil_engineering/IntroToPartialDiffEqns.pdf

https://www.classle.net/book/linear-partial-differential-equations-second-and-higher-order-constant-coefficients

Mathematics Websites: The following information on the Mathematics Web sites will be an additional source of information for references and historical development of the Mathematics. Some biographies of outstanding mathematicians are also available. This is the common information for both teachers and students of Mathematics**.**

1. http://scienceworld.wolfram.com/biography/topics/Mathematicians.html
2. http://teachers.sduhsd.k12.ca.us/abrown/index2.html
3. http://www.maths.tcd.ie/pub/HistMath/People/RBallHist.html
   Mathematicians of the 17th and 18th Centuries
4. http://www.geometry.net/math.html
   A Geometry Site
5. http://www-history.mcs.st-andrews.ac.uk/history/Indexes/Full_Alph.html
   Site of Biographies of Mathematicians
6. http://mathforum.org
   This site includes resources in mathematics for school students, teachers, parents. Also contains some research related material on mathematics teaching and learning. The 'Problems of the Week' contains problems at different levels of mathematics. It includes selected alternative solutions posted by problem solvers which is really nice. The `Ask Dr. Math' gives useful explanations of math concepts and the discussion groups are about teaching methods.
7. http://www.cut-the-knot.org
   Contains interesting puzzles, problems, theorems, proofs, etc. Also has links to other good sites (including all those listed below).
8. http://nrich.maths.org
   The site is run by the University of Cambridge. It contains problems for different age groups (5 to 18) that one can post solutions to. Selected solutions are published at the website. One can also post questions. There is an archive of questions posted earlier with answers (in blue coloured font). There are also articles, features, etc.
9. http://archives.math.utk.edu/
   A fairly comprehensive archive: contains teaching materials, public domain software, shareware, books, articles, etc.
10. http://www-groups.dcs.st-and.ac.uk/~history/
    The MacTutor history of mathematics archive. The best known website for historical information about mathematicians and mathematics.
11. http://www.maa.org/
    This is the website of the Mathematical Association of America. Contains useful resources for college mathematics teachers including book reviews.
12. http://e-math.ams.org/ Website of the main professional organization in mathematics: American Mathematical Society. The journal `Notices of the AMS' is online. Plus Interesting essays.

L	T	P	C
3	1	0	4

Course Code: U3ECB01

Course name: SEMICONDUCTOR DEVICES AND CIRCUITS

Designed for year II : Sem III.

COURSE OBJECTIVES

1. To deliver the knowledge about physics of basic semiconductor devices
2. To enhance comprehension capabilities of students through understanding of electronic devices
3. To create foundation for forthcoming circuit design courses

COURSE OUTCOMES

On successful completion of this course students will be able to:

1. Ability to understand basics and characteristics of semiconductor diode.
2. Ability to understand the operation and biasing techniques of bipolar transistor.
3. Ability to understand the behavior of filed effect transistor.
4. Small signal model of transistor.
5. Ability to understand the diode application circuits like rectifiers , regulators.

COURSE CONTENT

Unit I: Junction Diode Characteristics **9+3**

N and P –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level in intrinsic and extrinsic semiconductors, P-N JUNCTION: The p-n junction Energy band diagram , The current components in p-n diode, Diode equation, Volt-ampere characteristics of p-n diode, Temperature dependence of VI characteristic, Transition and Diffusion capacitances, Step graded junction, Breakdown Mechanisms in Semi Conductor (Avalanche and Zener breakdown) Diodes, Zener diode characteristics, Characteristics of Tunnel Diode with the help of energy band diagrams, Varactor Diode, LED, LCD , photo diode, Opto-couplers, Special Diodes, Clipper and Clamper.

Unit II: Bipolar Junction Transistor Characteristics and Biasing **9+3**

Introduction; Transistor Construction; Transistor Operation; Input and Output Characteristics in Common Base, Common Emitter and Common Collector ; DC Biasing – Introduction, Operating Point, Fixed Bias Circuit, Emitter-Stabilized Bias Circuit, Voltage-Divider Bias, Stabilization Factor (S, S', S"), Compensation Techniques (Compensation against variation in V_{be}, I_{co} etc).

Unit III: Field Effect Transistor Characteristics and Biasing **9+3**

Introduction, Construction and Characteristics of JFETs-Transfer Characteristics, Drain Characteristics, Important Relationships; Construction and Characteristics of MOSFETs (Depletion Type and Enhancement Type);Thermal Run away and Thermal stability, FET and MOSFET Biasing – Fixed Bias Configuration, Self Bias Configuration, Voltage- Divider Biasing.

Unit IV: BJT Small-Signal Analysis **9+3**

Introduction, Amplification in the AC Domain, BJT Transistor Modeling, Important Parameters: Z_i, Z_o, A_v, A_i; The r_e Transistor Model, The Hybrid Equivalent Model – CE Fixed Bias Configuration, Collector Base Bias, Voltage – Divider Bias, CB, CC. Approximate Hybrid Equivalent Circuit.

Unit V: CRT, Rectifiers, Filters and Regulators **9+3**

Principles of CRT- Electrostatic and magnetic focusing; **Rectifier**: Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Introduction to SCR and UJT ; **Filter:** Inductor filter, Capacitor filter, LC- filter, Pi- section filter, Multiple LC- section and Multiple Pi-section filter, and comparison of various filter circuits in terms of ripple factors, **Regulator:**Series and Shunt voltage regulators, boot and buck regulators, SMPS.

Total: 45 L+15 T= 60hours

TEXT BOOKS

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGrawHill, 2ndEd.,2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition,2006.

REFERENCE BOOKS

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn..1998.
3. David A Bell, Electronic Devices and circuits, 4th Edition, PHI 2003.

Online Learning:

1. **https://archive.org/details/ElectronicDevicesCircuits**
2. **http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-012-microelectronic-devices-and-circuits-fall-2005/**

LEARNING AND TEACHING ACTIVITIES:

Learning and Teaching Modes:

This course relies on lectures to guide through the material, tutorial classes to provide students with class, and a sequence of written and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

Course Code: U3ECB02
Course Name: DIGITAL ELECTRONICS
Designed for: Year: II Semester: III

L	T	P	C
3	1	0	4

COURSE EDUCATIONAL OBJECTIVES:

1. To completely understand the number systems, codes and Boolean algebra and their simplification.
2. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
3. To introduce the concept of memories and programmable logic devices.

COURSE OUTCOME:

1. Ability to apply the knowledge of basic digital logic concepts to design digital circuits.
2. Able to design combinational circuits like serial/parallel adder & subtractor and also code converter.
3. Ability to design sequential logic circuits like registers and counters using Flip flops
4. Able to reduce the hazards and also design moore, meeley circuits.
5. Ability to understand the memory devices.

PRE-REQUISITE:

Basic electronic circuits.

COURSE CONTENT:

UNIT I DIGITAL FUNDAMENTALS **L-9+T-3**

Number Systems – Codes – Boolean algebra – Complements – Logic Gates – Boolean Equations, canonical and standard forms - simplification of Boolean functions by Karnaugh's map and Tabulation method up to five variable map - NAND, NOR, EX-OR & EX-NOR implementation of Boolean functions.

UNIT II COMBINATIONAL CIRCUITS **L-9+T-3**

Arithmetic circuits – Adders, Subtractor, Serial adder/ Subtractor, Parallel adder/ Subtractor - Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexers - Encoder / Decoder – parity checker – code converters.

UNIT III SEQUENTIAL CIRCUITS **L-9+T-3**

Flip Flops - Operation and excitation tables of RS,JK, Master Slave, D and T Latch; Shift registers – SISO, SIPO, PISO, PIPO, Bi-Directional, Universal Register; counters, shift registers Counters - Ripple, synchronous, ring and up-down, Design of counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS L-9+T-3

Analysis and design of asynchronous sequential circuits — Race-free state assignment – Hazards, ASM Chart, HDL for Sequential circuits –moore, mealy models – State table, State diagram, Reduction of state tables, Sequence generator.

UNIT V APPLICATIONS OF DIGITAL ELECTRONICS L-9+T-3

Design of multiplexers and demultiplexers, encoder & decoders, full adder, flip-flops, counters, study of memory components, ROM, RAM, EPROM, EEPROM, Study of logic devices, USB flash drives, memory registers.

TOTAL: 45 L+15 T = 60 Hrs

Learning Resources

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Charles H.Roth. Fundamentals of Logic Design, Thomson Learning, 2003.

REFERENCE BOOKS

1. John F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI, 2006
2. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, 2002.
3. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 3rd Edition., Vikas Publishing House Pvt. Ltd, New Delhi, 2006
4. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6th Edition, TMH, 2003.
5. William H. Gothmann, Digital Electronics, 2nd Edition, PHI, 1982.
6. Thomas L. Floyd, Digital Fundamentals, 8th Edition, Pearson Education Inc, New Delhi, 2003 Donald D.Givone, Digital Principles and Design, TMH.

ONLINE RESOURCES:

- http://en.wikipedia.org/wiki/digitalelectronics
- http://nptel.ac.in/courses/117103064/
- http://nptel.ac.in/courses/117106086/

LEARNING AND TEACHING ACTIVITIES:

LEARNING AND TEACHING MODES:

This course relies on lectures to guide through the material, tutorial classes to provide students with class, and a sequence of written and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

Course Code: U3ECB03

L	T	P	C
3	1	0	4

Course Name: CONTROL SYSTEM

Designed for Year: II: Sem III.

COURSE OBJECTIVES

1. To understand the methods of representation of systems and getting their transfer function models.
2. To provide adequate knowledge in the time response of systems and steady state error analysis.
3. To give basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
4. To understand the concept of stability of control system and methods of stability analysis.
5. To study the three ways of designing compensation for a control system

COURSE OUTCOMES

1. Shall draw the block diagram representation of control systems of different applications. Shall be able to simplify the block diagram and write equations which are governing the system.
2. For the given application, shall be able to find out the time domain specifications and check whether the specifications are within the limits.
3. For the given application, shall be able to find out the frequency domain specifications and check whether the specifications are within the limits.
4. For the given application, shall be in a position to check the stability of the system.
5. Shall design controllers to improve time domain specifications and design compensators to improve frequency domain specifications.

PRE-REQUISITE :

Electric Circuit theory

COURSE CONTENT

UNIT I MODELING OF SYSTEMS **9+3**

The control system, Mathematical models of physical systems – Introduction, Differential equations of physical systems –Laplace Transform technique-- Mechanical systems, Friction, Translational systems (Mechanical accelerometer, Levered systems excluded), Rotational systems, Gear trains, Electrical systems, Analogous systems

Block diagrams and signal flow graphs: Transfer functions, Block diagram algebra, and Signal Flow graphs

UNIT II CONTINUOUS AND DISCRETE SYSTEMS **9+3**

Linear time invariant Continuous and discrete systems; transfer functions- transformation from S domain to Z domain- applications

UNIT III TIME RESPONSE OF FEED BACK CONTROL SYSTEMS **9+3**

Standard test signals, Unit step response of First and second order systems, Time response specifications, Time response specifications of second order systems, steady – state errors and error constants.

UNIT IV STABILITY ANALYSIS **9+3**

Concepts of stability, Necessary conditions for Stability, Routh- stability criterion, Relative stability analysis; More on the Routh stability criterion

Root–Locus Techniques: Introduction, The root locus concepts, Construction of root loci.

UNIT V FREQUENCY DOMAIN ANALYSIS **9+3**

Stability in the frequency domain: Nyquist Stability criterion, (Inverse polar plots excluded), Assessment of relative stability using Nyquist criterion,
Frequency domain analysis: Introduction,Correlation between time and frequency response, Bode plots, All pass and minimum phase systems, Experimental determination of transfer functions, Assessment of relative stability using Bode Plots.

Total (45 Periods+15 Periods=60 Periods)

TEXT BOOKS

1. M.Gopal “Control Systems Principles & Design “ Tata McGraw Hill,2002.
2. Benjamin C. Kuo, “Automatic Control systems”, Pearson Education, 2003.

REFERENCE BOOKS

1. Naresh K. Shinha,” Control Systems”, New Age Publications, 1996.
2. D.K.Cheng, Analysis of linear systems" Addison-Wesley, 1959.
3. I.J.Nagrath and M.Gopal, " Control systems Engineering", 2nd edition, Wiley eastern, New Delhi, 1982.
4. Nise, N.S., “Control Systems Engineering”, 4th Edition, John Wiley, 2007.
5. Samarajit Ghosh, “Control Systems”, Pearson Education, 2004.

Online Resources:

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. http://140.78.137.200/ifac50/Project_E/content1.htm
2. http://www.springer.com/birkhauser/engineering/book/978-0-8176-4203-7
3. www. nptel.ac.in

LEARNING AND TEACHING ACTIVITIES:

Learning and Teaching Modes:

This course relies on lectures to guide through the material, tutorial classes to provide students with class, and a sequence of written and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

L	T	P	C
3	0	0	3

Course Code:U3CSB01

Course Code: DATA STRUCTURES & ALGORITHMS

Course designed for year: II: Sem III.

Course Objectives:

Students undergoing this course are expected:

1. Be exposed to the concepts of ADTs
2. Learn linear data structures – list, stack, and queue.
3. Learn non-linear data structures – Tree, graph etc
4. Be exposed to sorting, searching, hashing algorithms

Course Outcomes:

Students undergoing this course are able to:

1. Identify user defined data types, linear data structures for solving real world problems.
2. Write modular programs on non linear data structures and algorithms for solving engineering problems efficiently.
3. Illustrate some of the special trees and Hashing Techniques.
4. State what is an undirected graph, directed graph and apply BFS and DFS to traverse a graph
5. Demonstrate knowledge of sorting algorithms and their run-time complexity.

PRE-REQUISITE:

Fundamentals of Computing

COURSE CONTENT

UNIT I LINEAR DATA STRUCTURE **9**

Introduction - Abstract Data Type (ADT) – The List ADT – Array Implementation – Linked List Implementation – Cursor Implementation – The Stack ADT – The Queue ADT – Applications of Stack, Queue and List.

UNIT II TREES **9**

Introduction to trees - Tree Traversal - Binary Trees - Definitions – Expression Tree – Binary Tree Traversals - The Search Tree ADT – Binary Search Trees - AVL Tree.

UNIT III SPECIAL TREES & HASHING **9**

Splay Tree – B-Tree - Priority Queue - Binary Heap – Threaded Binary Tree. Hashing - Separate Chaining – Open Addressing – Linear Probing – Quadratic Probing – Double Hashing –Rehashing

UNIT IV GRAPH **9**

Introduction to Graphs - Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths –Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm- Kruskal's Algorithm – Breadth first search – Depth-First Search – Undirected Graphs – Biconnectivity.

UNIT V SORTING & SEARCHING **9**

Sorting algorithm- Insertion sort- Selection sort- Shell sort-Bubble sort- Quick sort- Heap sort-Merge sort- Radix sort - Searching – Linear search - Binary search.

Total : 45 Hrs

TEXT BOOK

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition , Pearson Education, 2005.

REFERENCE BOOKS

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First Edition Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005.
3. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "Fundamentals of Data Structure", Computer Science Press, 1995.

Online Learning:

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. http://simplenotions.wordpress.com/2009/05/13/java-standard-data-structures-big-o-notation/
2. http://mathworld.wolfram.com/DataStructure.html/.

LEARNING AND TEACHING ACTIVITIES:

Learning and Teaching Modes:

This course relies on lectures to guide through the material, tutorial classes to provide students with class, and a sequence of written and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

Course Code: U3CEB13

L	T	P	C
3	0	0	3

Course Name: ENVIRONMENTAL SCIENCE AND ENGINEERING

Designed for: Year: II Semester: III

COURSE OBJECTIVES

Students undergoing this course are expected to be conversant with:

- Environmental problems and the possible solutions
- Imparting knowledge on energy sources and their management
- Disaster management, Green house effect and Pollution and its control methods
- Various environmental protection acts.

COURSE OUTCOMES

After completing third semester, students from all branches of engineering will possess:

1. Students will have knowledge and scope of environmental science studies which encompasses various conventional and non- conventional energy sources and their management.
2. Students will develop understanding of various food chains, food webs, trophic level, eco systems and their conversation.
3. Students will have knowledge about different types of pollution and their control methods.
4. Students will get acquainted with various environmental protection acts.
5. Student will get awareness of population growth and social health programmes.

PRE-REQUISITE:

Students should have studied Science courses (Chemistry, Physics and Biology)

COURSE CONTENT

UNIT- I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Definition, scope and importance – Need for public awareness – Forest resources: Use, effect of their over exploitation and Deforestation, Timber extraction and Mining – Water resources: Surface source, subsurface source and ground water, Rainwater harvesting (Methods & merits and simple layout) floods, drought- Dams, benefits and problems–Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, Drainage and their effects – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources – Land resources: Land as a resource, land degradation, soil erosion, Desertification and Landslides.

UNIT- II ECOSYSTEMS AND BIODIVERSITY 9

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains,

food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Aquatic ecosystems (ponds and oceans) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity –Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at local level – India as a mega-diversity nation – Hot spots of biodiversity – criteria for recognizing hot spots – Biodiversity hot spots in India – Threats to biodiversity: habitat loss, poaching of wildlife - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III ENVIRONMENTAL POLLUTION 9

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Soil waste Management: Causes, effects and control measures of urban and industrial wastes –Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides and tsunami

UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, case studies –Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – Consumerism and waste products – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act –Forest Conservation Act.

UNIT- V HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth, variation among nations – Population explosion – Family Welfare Programme – Environment and human health – Human Rights – Value Education – HIV / AIDS – Women and Child Welfare – Role of Information Technology in Environment and human health.

Total=45 Periods

TOPICS BEYOND THE SYLLABUS

1. Emerging technology on waste management.
2. E-waste management
3. Water preservation

TEXT BOOKS

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co 2006
3. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science.2009.

REFERENCE BOOKS

1. A.Kaushik and C.P. Kaushik, Environmental Science and Engineering, New Age International publishers, 2005.
2. S.S. Dara, Text book of Environmental Chemistry and Pollution Control, S.Chand and Co., 2002.
3. N. Nandini, N. Sunitha and SucharitaTandon, Environmental Studies, Sapna Book House, 2007.

7.3 Online Resources

1. http://www.who.int/topics/environmental_pollution/en/
2. http://edugreen.teri.res.in/explore/explore.htm
3. http://www.gogreenindia.co.in/

8. LEARNING AND TEACHING ACTIVITIES:

8.1 LEARNING AND TEACHING MODES

This course relies on lectures to guide through the material, tutorial classes to provide students with class, and a sequence of written and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

Course Code : U3ECB04

Course Name : SEMICONDUCTOR DEVICES AND CIRCUITS LAB

L	T	P	C
0	0	3	2

Course Objectives:

On completion of this course the student will understand

1. The methods of biasing transistors
2. Design of simple amplifier circuit
3. Mid-band analysis of amplifier circuit using small –signal equivalent circuit to determine gain input impedance and output impedance

Course Outcome:

1. Understand the significance of semiconductor devices characteristics and its parameters.
2. Ability to know what the areas diode devices are will take part.
3. Ability to learn the Q point of a transistor and biasing techniques.
4. Analyze the frequency response characteristics of semiconductor devices.
5. Understand the design aspects of any given electronics circuits.

Pre-requisites:

Physics Lab.

Course Content

LIST OF EXPERIMENTS:

CYCLE – 1

1. Characteristics of semiconductor diode & Zener diode.
2. Characteristics of CE & CB Configuration.
3. Characteristics of JFET and MOSFET
4. Characteristics of SCR
5. Characteristics of UJT

CYCLE – 2

1. Characteristics of photo diode and photo transistor
2. Design and Testing of Full Wave Rectifier Circuit without and with filter.

3. Characteristics of Shunt & Series Regulator.
4. Clippers and clampers
5. To design biasing circuit for BJT and finding the DC load line.

TEXT BOOKS

1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGrawHill, 2ndEd.,2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition,2006.

REFERENCE BOOKS

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn..1998.
3. David A Bell, Electronic Devices and circuits, 4th Edition, PHI 2003.

ONLINE LEARNING:

3. **https://archive.org/details/ElectronicDevicesCircuits**
4. **http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-012-microelectronic-devices-and-circuits-fall-2005/**

COURSE CODE : U3ECB05

COURSE NAME : DIGITAL ELECTRONICS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To Study and implement Combinational circuits.
2. To Study and implement Sequential circuits

Course Outcome:

1. Learn and know about the basic logic gates.
2. Ability to design the combinational circuits by using logic gates.
3. Ability to design the sequential circuits by using logic gates.
4. Able to understand the memory modules.
5. Know about applications of digital circuits in real world.

Pre-requisites:

Basic Electrical & Electronics Laboratory.

Course Content:

LIST OF EXPERIMENTS:

CYCLE I

1. Verification of logic gates & to implement Adder and Subtractor using logic gates.
2. To implement code conversion using logic gates
   (i) BCD to excess-3 code and vice versa
   (ii) Binary to gray and vice-versa
3. To implement a 4 bit binary Adder/ subtractor and BCD adder
4. To implement a 2 bit Magnitude Comparator using logic gates 4 BitMagnitude Comparator
5. To implement a 16 bit odd/even parity checker generator & to implement a Multiplexer and De-multiplexer using logic gates.

CYCLE – 2

6. To implement a encoder and decoder using logic gates
7. To Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters
8. To implement a 3-bit synchronous up/down counter
9. To implement a SISO, SIPO, PISO and PIPO shift registers using Flip- flops
10. To implement encoder and decoder using HDL language.

Text Book

1. M. Morris Mano, “Digital Design”, IV edition, Pearson Education, 2006.

Reference Books

1. Charles H.Roth Jr, “Fundamentals of Logic Design”, V edition – Jaico Publishing House, Mumbai,2003.

2. Donald D. Givone, “Digital Principles and Design”, Tata MCGraw Hill, 2003.
3. W.H.GOTHMANN, "Digital Electronics - An Introduction to Theory and Practice", Prentice Hall of India, 2000

Online Resources

1. onlinevt.blogspot.com/.../cs-2202-digital-principles-and-system.html/
2. www.tmhshop.com/digital-principles-and-system-design

L	T	P	C
0	0	3	2

Course Code: U3CSB05
Course Name: DATA STRUCTURES LAB

Course Educational Objectives:
Students undergoing this course are expected to

1. Be familiarized with good programming design methods, particularly Top- Down design.
2. Getting exposure in implementing the different data structures using C++
3. Appreciate recursive algorithms.

Course Outcomes:
Students undergoing this course are able to

1. Design and implement C programs for manipulating stacks, queues, linked lists, trees.
2. Apply good programming design methods for program development.
3. Apply the different data structures for implementing solutions to practical problems.
4. Develop recursive programs.
5. Develop Programs for Searching and Sorting.

Pre-requisites:
Computer Practice Laboratory

Course Content
UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS
C++ Programming features - Data Abstraction - Encapsulation - class - object - constructors – static members – constant members – member functions – pointers – references - Role of this pointer – Storage classes – function as arguments.
UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS
String Handling – Copy Constructor - Polymorphism – compile time and run time polymorphisms – function overloading – operators overloading – dynamic memory allocation - Nested classes - Inheritance – virtual functions.

LIST OF EXPERIMENTS:
CYCLE I

S.no	Experiment name
1	Implementation of Stack using Array
2	Implementation of Queue using Array
3	Implementation of linked list
4	Implementation of stack using linked list
5	Infix to postfix conversion
6	Evaluation of postfix expression

CYCLE II

7	Implementation of Binary Search Tree
8	Implementation of Breadth First Search and Depth First Search
9	Insertion Sort and Bubble Sort
10	Heap Sort
11	Quick Sort
12	Linear and Binary Search.

Text Book

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition , Pearson Education, 2005.

Reference Books

1. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First Edition Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005.
3. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "Fundamentals of Data Structure", Computer Science Press, 1995.

Online Resources

1. Learn C/C++ Today
2. Addison Wesley's Computer and Engineering Book Catalog and Programming Codes
3. CSE's ACM Programming Contest Homepage
4. Programming C under Linux, provided by RedHat
5. Sorting Algorithm Animation Demo
6. Analysis of Algorithms Home Page
7. Mathematical Programming Glossary
8. Algorithm Animation Links

SEMESTER IV

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U4MAB04	Probability and Random Processes	3	1	0	4
U4ECB05	Analog Electronic Circuits	3	0	0	3
U4ECB06	Linear Integrated Circuits	3	0	0	3
U4ECB08	Electromagnetic Fields	3	1	0	4
U4ECB09	Principles of Signals and Systems	3	1	0	4
U4CSB76	Object Oriented Programming	3	0	0	3
PRACTICAL					
U4ECB10	Linear Integrated Circuits Lab	0	0	3	2
U4ECB11	Analog Circuit Design Lab	0	0	3	2
U4CSB77	Object Oriented Programming Lab	0	0	3	2
Total Credits					27

L – Lecture; T – Tutorial; P – Practical; C - Credit

L	T	P	C
3	1	0	4

COURSE CODE : U4MAB04
COURSE NAME : PROBABILITY AND RANDOM PROCESS
DESIGNED FOR YEAR/SEM: II/IV

Course Educational Objectives :

- Providing theknowledge on the concepts of probability, standard distributions and two dimensional random variables.
- Providing theknowledge on the concepts of Auto-correlation function and spectral characterization of random processes in time domain and frequency domain respectively.
- Exposure in linear time-invariant system, System transfer function, linear systems with random inputs and outputs, White noise.

COURSE OUTCOMES:

1. Determine the probabilities, mean and moment generating functions of different types of random variables
2. Calculate probabilities, correlation co-efficient and regression lines of two dimensional random variables
3. Identify the nature of the process namely Binomial, Poisson, Normal, Markov, Sine wave processes and calculate stationary and transition probabilities.
4. Calculate the autocorrelation and Spectral density for the given Random processes.
5. Calculate the power spectrum of the random signals for the given linear time invariant system with transfer functions.

COURSE CONTENT:

UNIT I PROBABILITY AND RANDOM VARIABLES L- 9 + T-3

Probability concepts – Laws of Probability – Conditional Probability and Byes Theorem - Random variables - Moments - Moment Generating function – Binomial/ Poisson/ Geometric/ Uniform/ Exponential/ Gamma and Normal distributions - Functions of Random variable - Chebyshev inequality.

UNIT II TWO DIMENSIONAL RANDOM VARIABLESL-9+T-3

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES Definition and examples – First order Second order processes – Strictly stationary Wide-sense stationary and Ergodic processes – Markov process –
Binomial Poisson and Normal processes – Sine wave process

UNIT IV CORRELATION AND SPECTRAL DENSITIESL- 9 + T-3

Auto-correlation and Cross-correlation functions – 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 INPUT L- 9 + T-3

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: 45+15(Tutorial) = 60 periods

Text Books :

1. Peyton Z.Peebles/Jr/ Probability Random Variables and Random Signal Principles/ Tata McGraw-Hill/4th edition 2002.
2. O. C. Ibe/ Fundamentals of Applied Probability and Random Processes/ Elsevier/ Indian Reprint 2007.

References:

1. S.M. Ross/ Stochastic Processes/ 2nd edition/ John Wiley & Sons/ New Delhi/ 2004.
2. Medhi/ Stochastic Processes/ New Age Publishers/ New Delhi/ 1994.
3. Athansios Papoulis and S.Unnikrishna pillai/ Probability/ Random variables and stochastic processes/McGrawHill/4th edition 2002.

L	T	P	C
3	0	0	3

COURSE CODE : U4ECB05
COURSE NAME : ANALOG ELECTRONIC CIRCUITS

COURSE EDUCATIONAL OBJECTIVES:

1. To study the concepts of feedback and different types of negative feedback amplifiers.
2. To study the concept and structure of different types of oscillators.
3. To learn about the different types high frequency amplifiers and learn their characteristics.
4. To study the characteristics and structure of different power amplifiers.
5. To study about the different types of multivibrators and time base generators.

COURSE OUTCOMES:

On successful completion of this course, the student will be able

1. Demonstrate the working of feedback in transistorized amplifier circuits.
2. Design various oscillators for the given specification using transistor.
3. Design for the given specification large signal transistor amplifier for the given specification
4. Explain the performance of various power amplifiers.
5. Describe the characteristics of multivibrator and time base generators.

COURSE CONTENT :

Unit I Feedback Amplifiers **9**

Basic concept of Feedback Negative and positive feedback – analysis of Different types of negative feedback amplifier - voltage shunt-voltage series - current shunt - current series .

Unit II Oscillator **9**

Oscillators - Principle of sinusoidal oscillators - Bark Hausen criteria - RC oscillators - phase shift- Wienbridge - LC oscillators - Hartley , Colpitts -clapp oscillator, crystal oscillator.

Unit III High Frequency Amplifier **9**

High frequency analysis of BJT amplifiers, to obtain cutoff frequencies. Tuned amplifier - coupled circuit, unilateralisation of transistor, Q-factor, Analysis of single tuned & double tuned .stagger tuned amplifier (analysis not required) - Wide band amplifier: Gain-bandwidth trade off. Stability of tuned amplifiers using Neutralization techniques.

UnitIV. Power Amplifiers Application **9**

Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

Unit V MultivibratorsAnd Time Base Generators **9**

Switching characteristics of transistors – Bistable, Monostableand Astable operation –

Collector coupled and Emitter coupled circuits – Schmitt trigger - Voltage sweep generators – Current sweep generators

Total= 45 Periods

TEXT BOOKS:

1. Jacob Millman, Taub Pulse, Digital and Switching Waveforms 2nd Edition 2007.
2. David .A. Bell, Electric Circuits And Electronic Devices Oxford University Press, 2010.

REFERENCE BOOKS:

1. Bapat K N ,Electronic Devices & Circuits , Mc Graw Hill,1992.
2. Boylestead&Neshelsky ,Electronic Devices & Circuits, Pearson Education/PHI Ltd, 9th edition.
3. Sedra&Smith ,Microelectronic circuits, Oxford University Press, 5th ed.
4. Donald L.*Schilling* and Charles *Belove*, *'Electronic Circuits'*, Tata McGraw Hill, 3rd Edition, 2003.

ONLINE RESOURCES :

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. http://forum.jntuworld.com/showthread.php?3988-Electronics-devices-and-Circuits(EDC)-Notes-All-8-Units
2. http://books.google.co.in/books?id=lNnPSXOXgwwC&printsec=frontcover&dq=inauthor:%22Jacob+Millman%22&hl=en&sa=X&ei=a0ouUa-bOIuMrgedvoHgAw&ved=0CDEQ6wEwAA#v=onepage&q&f=false

COURSE CODE :U4ECB06
COURSE NAME : LINEAR INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

DESIGNED FOR YEAR/SEM:II/IV

COURSE EDUCATIONAL OBJECTIVES:

1. To study the concepts of operational amplifiers and differential amplifiers.
2. To study the applications of amplifiers in different circuits.
3. To learn about the oscillators.
4. To study the characteristics of IC 555 timer.
5. To study about the voltage regulators and application specific ICs.

COURSE OUTCOMES:

On successful completion of this course, the student will be able

1. Describe the concept of CMRR and AC-DC characteristics of operational amplifier.
2. Explain the applications of Op-Amp through wave generating circuits,A/D and D/A conveters..
3. Design the Active filters using Op-Amp for the given specifications.
4. Illustrate the schematic construction and operation of 555timer,PLL,VCO IC's.
5. Design the simple series/shunt voltage regulator using for the given specifications.

PRE-REQUISITE:

Electronic Devices and Circuits.

Unit I Circuit Configuration For Linear ICs 9

Current sources, Analysis of difference amplifiers with active loads, supply and temperature independent biasing, Band gap references, Monolithic IC operational amplifiers, specifications, frequency compensation, slew rate and methods of improving slew rate.

Unit II Applications Of Operational Amplifiers 9

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and Non inverting Amplifiers, Differentiator, Integrator, Voltage to current converter, Instrumentation amplifier, Sine wave Oscillator, Low-pass and band-pass filters, Comparator, Multivibrators and Schmitt trigger, Triangular wave generator, Precision rectifier, Log and Antilog amplifiers, Non-linear function generator.

Unit III Analog Multiplier And PLL 9

Analysis of four quadrant (Gilbert cell) and variable transconductance multipliers, Voltage controlled Oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators, Frequency synthesizers, Compander ICs.

Unit IV Analog To Digital And Digital To Analog Converters 9

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

Unit V Special Function ICs 9

Astable,bistable and Monostable Multi vibrators using 555 Timer, Voltage regulators-linear

and switched mode types, Switched capacitor filter, Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers, Video amplifiers, Fiber optic ICs

Total=45 Periods

TEXT BOOK

1. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill,1997.
2. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

REFERENCES BOOK

1. Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International, 1995.
2. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India,1996
3. RamakantA.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.

4.K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.

5.Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, 1997.

6.Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972.7. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education, 2004.

ONLINE RESOURCES :

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. http://books.google.co.in/books?id=aByz--9D63wC&pg=PA426&lpg=PA426&dq=D.Roy+Choudhury,+Shail+Jain,+%22Linear+Integrated+Circuits%22&source=bl&ots=ZI9W79sL7v&sig=njY7UjaGRypZMgxA-XblCk8WER0&hl=en&sa=X&ei=OTQuUczNJMXprQeV8oD4Cg&ved=0CCwQ6AEwAA#v=onepage&q&f=false
2. http://www.mediafire.com/oior5guwa0mb2nk

COURSE CODE : U4ECB08
COURSE NAME : ELECTROMAGNETIC FIELDS
DESIGNED FOR YEAR/SEM: II/IV

L	T	P	C
3	1	0	4

COURSE EDUCATIONAL OBJECTIVES:

1. Apply vector calculus to understand the behavior of static electric fields in standard configurations.
2. To become familiar with the fundamentals of Static magnetic Fields with the ability to calculate the magnetic field, stored energy, and inductance for simple distributions of current density
3. To understand the relationship between Electromagnetics and circuit elements.
4. To understand the relation between the electromagnetic fields under time varying situations
5. To familiarize the students with the concept of electromagnetic fields in various electronic devices.

COURSE OUTCOMES:

On successful completion of this course, the student will be able

1. Analyze static electric field for the given parameter using Gradient, Divergence and Curl.
2. . Analyze static magnetic field for the given parameter using Ampere's Circuital Law and Biot-Savart Law.
3. Analyze time varying electromagnetic waves for given parameter using Maxwell's Equation.
4. Analyze electromagnetic waves that propagates in a medium and free-space.
5. Explain the characteristics of electronic devices using electrostatic and magnetostatic principles..

PRE-REQUISITE:

Electronic Devices and Circuits.

COURSE CONTENT :

UNIT I STATIC ELECTRIC FIELDS **9+3**

Introduction to co-ordinate system- Gradient , Divergence , Curl , Divergence theorem, Stokes theorem- Coulombs law , Electric field intensity , Principle of superposition , field intensity from point charges, field due to continuous distribution of charges Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength ,Energy and Energy density, Poisson and Laplace equation and their application

UNIT II STATIC MAGNETIC FIELDS **9+3**

Magnetic field intensity and magnetic flux density, Ampere's Circuital law, , Biot-savart law, The scalar and vector magnetic potentials, magnetic dipole., Permeability- Field computation. Inductance, Energy in an Inductor and Energy density, Boundary relation, Hysterisis, Reluctance and Permeance.

UNIT III TIME VARYING ELECTRIC AND MAGNETIC FIELDS **9+3**

Faradays law , Transformer and Mutual induction ,Maxwell's equation , Self and Mutual inductance ,Displacement current , Amperes law and its inconsistency for time varying fields , Boundary relation , Poynting vector , interpretation of ExH. Simple application.

UNIT IV ELECTROMAGNETIC WAVES **9+3**

EM waves in vacuum and in matter, monochromatic plane waves, reflection and transmission at interfaces, scalar and vector potentials, Lorentz gauge, retarded potentials. Transmission lines: Quasi-TEM analysis, characteristic impedance, standing wave ratio, matching techniques

UNITV APPLICATION OF STATIC FIELDS AND COMPUTATIONAL METHOD 9+3

Deflection of a charged particle, CRO, Ink Jet Printer, Electro static generator, Magnetic Separator, Cyclotron, Velocity selector and Mass Spectrometer, Electromagnetic pump, Introduction to field computation methods-FDM,FEM,MOM , Numerical problems

TOTAL: 45+15(Tutorial) = 60 periods

LEARNING RESOURCES:

TEXT BOOKS:

1. William H.Hayt : "Engineering Electromagnetics" TATA 2003
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 2nd edition 2003. (Unit IV, V). McGraw-Hill, 9th reprint

REFERENCE BOOKS:

1. Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons (3rd edition 2003)
2 .Narayana Rao, N : "Elements of Engineering Electromagnetics" 4th edition, Prentice Hall of India, New Delhi, 1998.
3. M.N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, Third edition.
4. David K.Cherp: "Field and Wave Electromagnetics - Second Edition-Pearson Edition.
5. David J.Grithiths: "Introduction to Electrodynamics- III Edition-PHI.

COURSE CODE: U4ECB09
COURSE TITLE: PRINCIPLES OF SIGNALS AND SYSTEMS
DESIGNED FOR : YEAR: II SEMESTER : IV
PREREQUISITES: ELECTRIC CIRCUIT THEORY.

L	T	P	C
3	1	0	4

COURSE EDUCATIONAL OBJECTIVES

1. To study the properties and representation of discrete and continuous signals.
2. To study the sampling process and analysis of discrete systems using z-transforms.
3. To study the analysis and synthesis of discrete time systems.

COURSE OUTCOMES:

1. Describe continuous, discrete, periodic, non periodic, linear, non-linear and time variant and time invariant systems.
2. Apply Laplace and Fourier concepts to analyze the given the continuous time signal.
3. Analyze the given continuous systems using Fourier transform and Laplace transform.
4. Develop the state space model for the given LTI system.
5. Explain the concept of sampling, aliasing and tools for the analysis of discrete time signals such as DTFT and Z Transform.

PRE-REQUISITES:

1. Laplace Transform, Fourier series, Fourier transform

COURSE CONTENT

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS L-9+T-3=12

Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp,Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic,random signals, CT systems and DT systems, Basic properties of systems - Linear Time invariant Systems and properties.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS L-9+T-3=12

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

UNIT III LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS L-9+T-3=12

Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response , Fourier and Laplace transforms in analysis, State variable equations and matrix representation of systems

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS L-9+T-3=12

Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z-transform.

UNIT V LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS L-9+T-3=12

Difference equations, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms , State variable equations and matrix representation of systems.

TOTAL : 45+15(Tutorial) = 60 periods

BEYOND THE SYLLABUS

LEARNING RESOURCES

Text Books:

1. Allan V. Oppenhein et al, “Signals and Systems”, Prentice Hall of India Pvt. Ltd, 1997.

Reference Books:

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

L	T	P	C
3	0	0	3

COURSE CODE: U4CSB76
COURSE NAME: OBJECT ORIENTED PROGRAMMING
COURSE OUTCOMES:

After the completion of the course, Students will be able to

1. Explain the concepts of object-oriented programming and basic structure of C++ programming.
2. Apply the concept of constructor and destructor for given problem in C++..
3. Demonstrate the template and exception handling for simple and complex programs..
4. Construct the C++ program, by using various inheritance concepts and virtual function for given problem.
5. Discuss various File IO stream, RTTI, and standards template library.

PRE-REQUISITE:

Fundamental of computing.

COURSE CONTENT

UNIT I **9**

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism.

Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions - static members – Objects – pointers and objects – constant objects – nested classes – local classes

UNIT II **9**

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

UNIT III **9**

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

UNIT IV **8**

Inheritance – public, private, and protected derivations – multiple inheritance - virtual base class – abstract class – composite objects Runtime polymorphism – virtual functions – pure virtual functions.

UNIT V **10**

RTTI – typeid – dynamic casting – RTTI and templates – cross casting – down casting .

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

TOTAL = 45 periods

TEXT BOOK

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.

REFERENCE BOOK

1. Ira Pohl, “Object Oriented Programming using C++”, Pearson Education, Second Edition Reprint 2004..
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, “C++ Primer”, Fourth Edition, Pearson Education, 2005.
3. B. Stroustrup, “The C++ Programming language”, Third edition, Pearson Education, 2004

LEARNING AND TEACHING ACTIVITIES:

Learning and Teaching Modes:

This course relies on lectures to guide through the material, powerpoint presentataion to provide students with class, and a sequence of written and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the Course.

COURSE CODE :U4ECB10
COURSE NAME :LINEAR INTEGRATED CIRCUITS LAB
DESIGNED FOR YEAR/SEM: II/IV

L	T	P	C
0	0	3	2

COURSE EDUCATIONAL OBJECTIVES:

1. To introduce how to design and analyze the different types of amplifier circuits.
2. To introduce the usage of converters and filters in the feedback circuits.
3. To introduce the design of multivibrators and trigger circuits using op-amps.
4. To introduce the design of multivibrators using timers.
5. To analyze the characteristics of PLL and design the frequency multiplier and signal conditioning circuit.

COURSE OUTCOME:

1. Develop and Implement the circuits with feedback.
2. Develop and implement Oscillator circuits using transistor.
3. Develop and implement high frequency amplifiers, power amplifiers and multivibrators.

PRE-REQUISITE:

Electronic Devices & Circuits.

COURSE CONTENT :

LIST OF EXPERIMENTS

CYCLE -1

1. Design of Inverting, Non inverting amplifiers,adder&subtractor
2. Design of Integrator and Differentiator.,differential amplifier
3. A to D converters, D to A converters
4. Active lowpass, Highpass ,bandstop and bandpass filters/notch filter
5. Astable&Monostablemultivibrators using op-amp.

CYCLE-2

6. Schmitt Trigger using op-amp
7. Phase shift and Wien bridge oscillators using op-amp.
8. Astable and monostablemultivibrators using Timer.
9. PLL characteristics and its use as Frequency Multiplier.
10. Design a signal conditioning circuit for thermistor.

LEARNING RESOURCES

TEXT BOOK

1. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill,1997.
2. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

REFERENCES BOOK

1. Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International, 1995.
2. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India,1996.
3. RamakantA.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.
4.K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.
5.Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, 1997.
6.Millman.J. andHalkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972.7. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education, 2004.

L	T	P	C
0	0	3	2

COURSE CODE :U4ECB11
COURSE NAME :ANALOG CIRCUIT DESIGN LAB
DESIGNED FOR YEAR/SEM: II/IV

COURSE EDUCATIONAL OBJECTIVES:

1. To understand the usage of different types of amplifiers.
2. To design and understand the usage of different types of oscillators.
3. To practically design and understand the usage of the power amplifiers.
4. To understand the usage of different types of multivibrators.
5. To design the amplifiers and obtain their CMRR.

COURSE OUTCOME:

1. To identify the different feedback circuits.
2. To use different types of oscillators in real time.
3. To analyze the different types of high frequency amplifiers.
4. To use the different types of power amplifiers in real world.
5. To use and analyze the different types of multivibrators.

PRE-REQUISITE:

Electronic Devices and Circuits.

COURSE CONTENT :

LIST OF EXPERIMENTS

CYCLE -1

1. Integrators and Differentiators for varying time constant.
2. Design of amplifier by using voltage divider bias, with and without feedback (Frequency response, gain and BW calculation)
3. Design a RC coupled amplifier (voltage series ,Current shunt) (Frequency response, gain and BW calculation)
4. RC phase shift oscillators &wein bridge oscillators
5. LC & Hartley oscillators,colpitts oscillator

CYCLE-2

6. Tuned Class C Amplifier
7. Transistorized Astable, Monostable and Bistablemultivibrators
8. To design a Differential amplifier using BJT and determine its CMRR
9. To design an Darlington Amplifier using BJT
10. To construct a Source follower with Bootstrapped gate resistance

TEXT BOOKS:

1. Jacob Millman, Taub Pulse, Digital and Switching Waveforms 2nd Edition 2007.
2. David .A. Bell, Electric Circuits And Electronic Devices Oxford University Press, 2010.

REFERENCE BOOKS:

1. Bapat K N ,Electronic Devices & Circuits , Mc Graw Hill,1992.
2. Boylestead&Neshelsky ,Electronic Devices & Circuits, Pearson Education/PHI Ltd, 9th edition.
3. Sedra&Smith ,Microelectronic circuits, Oxford University Press, 5th ed.
4. Donald L.*Schilling* and Charles *Belove*, *'Electronic Circuits'*, Tata McGraw Hill, 3rd Edition, 2003.

ONLINE RESOURCES :

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. http://forum.jntuworld.com/showthread.php?3988-Electronics-devices-and-Circuits(EDC)-
2. http://books.google.co.in/books?id=lNnPSXOXgwwC&printsec=frontcover&dq=inauthor:%22Jacob+Millman%22&hl=en&sa=X&ei=a0ouUa-bOIuMrgedvoHgAw&ved=0CDEQ6wEwAA#v=onepage&q&f=false

LEARNING AND TEACHING ACTIVITIES:

Learning and Teaching Modes:

This course relies on practical to guide through the material, GlobarenaSoftwares to provide students with class, and a sequence of modal practicals and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

COURSE CODE : U4CSB77
COURSE NAME : OBJECT ORIENTED PROGRAMMING LAB

L	T	P	C
0	0	3	2

DESIGNED FOR YEAR/SEM : II/IV

COURSE EDUCATIONAL OBJECTIVES

1. Programs could be written and implement the concepts of C++ Language.
2. Students can learn the virtual function and constructor.
3. To study the programs using template.

COURSE OUTCOME:

After the successful completion of the course, the students can be able to

1. Understand and practice on C++ about the objects and classes.
2. Analyse about the Oops concepts like Inheritance and Encapsulation.
3. Understand and practice about the stack and queues on C++.
4. Analyse the file handling concepts in Object Oriented Programming language.

PRE-REQUISITE:

Fundamental of computing.

COURSE CONTENT :

LIST OF EXPERIMENTS

CYCLE-I

1.Design C++ classes with static members.

2. Design C++ classes with default arguments, friend functions.

3. Implement complex number class with necessary operator overloading

4.Implement Matrix class with dynamic memory allocation and necessary methods. 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.

CYCLE-II

6. Develop templates of standard sorting algorithms such as bubble sort, insertion sort, merge sort, and quick sort.

7. Design stack and queue classes with necessary exception handling.

8. Design C++ Classes with Concepts of Inheritance.

9. Design C++ Program as virtual Functions and virtual Base Class.

10. Design C++ Classes with necessary File Handling Concepts.(Sequential and random Access)

LEARNING RESOURCES:

TEXT BOOK

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.

REFERENCE BOOK

1. Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Second Edition Reprint 2004..
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Primer", Fourth Edition, Pearson Education, 2005.
3. B. Stroustrup, "The C++ Programming language", Third edition, Pearson Education, 2004

LEARNING AND TEACHING ACTIVITIES:

Learning and Teaching Modes:

This course relies on lectures to guide through the material, to provide students with class, and a sequence of written assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

B.TECH

ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum & Syllabus
Regulation 2013

SEMESTER – V
[Regular]

THEORY AND LAB COURSES

B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATION 2013

CURRICULUM

SEMESTER V

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U5ECB12	Digital Signal Processing	3	1	0	4
U5ECB13	Communication Systems and Techniques	3	0	0	3
U5ECB14	Microprocessors and Microcontrollers	3	1	0	4
U5ECB15	Transmission Lines and Waveguides	3	1	0	4
U5CSB15	Data Communication and Computer Networks	3	0	0	3
U5BAB01	Total Quality management	3	0	0	3
PRACTICAL					
U5ECB16	Digital Signal Processing Lab	0	0	3	2
U5ECB17	Microprocessors and Microcontrollers Lab	0	0	3	2
U5CSB17	Networks Lab	0	0	3	2
Total Credits					27

L – Lecture; T – Tutorial; P – Practical; C - Credit

COURSE CODE : U5ECB12
COURSE NAME : DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	4

PRE-REQUISITE:
Signals and Systems, Engineering Mathematics

LINKS TO OTHER COURSES :
Fundamental to Digital Image Processing

COURSE EDUCATIONAL OBJECTIVES:
Students learning this course will be exposed to:

11. To understand the discrete fourier transform and fast fourier transform and its use in spectral analysis, data compression and fast convolution, understand the trade offs between frequency resolution and signal duration along with use of windows for reducing frequency leakage.
12. To understand the various digital filter design methods meeting the prescribed specifications like pole/zero placement or bilinear transformation and appreciate design trade offs between specifications and characteristics like filter order, time constant, pole locations, etc,.
13. To understand two key DSP concepts, Sampling and Quantization along with practical issues involved in sampling, aliasing, analog reconstruction of signals in choosing and defining specifications antialiasing prefilters and antiimaging postfilters.

COURSE OUTCOMES:
On successful completion of this course students will be able
1. To use the Fourier Transforms for various applications such as image processing and speech analysis, which forms the basis of signal processing.
2. To use and analyze IIR and FIR filter structures.
3. To analyze the sample and hold operations effectively in the signal processing methodologies.
4. To use the sampling techniques efficiently when the signal processing involves multiple stages and use high quality A/D and D/A conversion in multirate systems.
5. To use the Texas Instruments products for signal processing and should be aware of the different TI products that are available for signal processing.

COURSE CONTENT :

UNIT I Introduction And FFT Algorithm **Lecture 9 + Tutorial 3**
Advantages and typical applications of DSP; Review of discrete-time, signal and system analysis. Discrete Fourier series - properties of DFS - periodic convolution - DFT - properties – linear, convolution using DFT - computation of DFT - circular convolution - decimation in time and Decimation in frequency algorithms - FFT algorithm.

UNIT II Digital Filters Design **Lecture 9 + Tutorial 3**

Design of IIR digital filters from analog filters - Butterworth and Chebyshev filters – design examples -impulse invariant and bilinear transformation methods - spectral transformation of IIR filters - FIR filter design - linear phase characteristics - window method. IIR and FIR Filter structures.

UNIT III Finite Word Length Effects **Lecture 9 + Tutorial 3**

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – co-efficient quantization error - limit cycle oscillation – signal scaling – analytical model of sample and hold operations

UNIT IV Multirate DSP **Lecture 9 + Tutorial 3**

Sampling and discrete-time processing of continuous time signals; Decimation and interpolation.. Multirate DSP and its application in sampling rate conversion and high quality A/D and D/A conversion.

UNIT V Digital Signal Processors **Lecture 9 + Tutorial 3**

Computer architecture for signal processing - hardware architecture - pipelining – hardware, multiplier - accumulator - special instructions - general purpose digital signal processors Texas instruments - TMS 320 family - Motorola DSP 56000 family - analog devices ADSP-2100 family - implementation of DSP algorithm on general purpose digital signal processors. Comparison of FPGA & DSP for real time application- recent trend in TMS

TOTAL: 45+15(Tutorial) = 60 periods

LEARNING RESOURCES:

Text books:

1. Mitra, S.K., “Digital Signal Processing-A Computer Based Approach”, 3rd Ed., Tata Mcgraw-Hill.2005
2. Oppenheim, A.V. and Schafer, R.W. with Buck, J.R., “Discrete Time Signal Processing”, 2nd Ed., Prentice-Hall of India.2002
3. Proakis, J.G. and Manolakis, D.G., “Digital Signal Processing: Principles, Algorithm and Applications”, 4th Ed., Pearson Education. 2007
4. Ifeachor, E.C. and Jervis, B.W., “Digital Signal Processing: A Practical Approach”, 2nd Ed., Pearson Education.2002

Reference:

1. Jeffrey, H.R., “Software Radio: A Modern Approach to Radio Engineering”, Pearson Education. 2002
2. Phi Lapseley, Jeff Bier, Amit Shohan & Lee E.A., “DSP ProcessorFundamentals-Architectures and Features”, IEEE Press
3. B.Venkataramani & M. Bhaskar, Digital Signal Processor Architecture, Programming and Application, TMH 2002.
4. Avtar singh, S.Srinivasan DSP Implementation using DSP microprocessor with Examples from TMS32C54XX -Thamson / Brooks cole Publishers, 2003

Online Resources :

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

a. http://en.wikipedia.org/wiki/digital signal processing
b. http://www.dspguru.com/info/tutor/other.html
c. http://www.dsprelated.com/

COURSE CODE : U5ECB13
COURSE NAME : COMMUNICATION SYSTEMS AND TECHNIQUES

L	T	P	C
3	0	0	3

PRE-REQUISITE:

Transforms and partial differential equation, Analog Electronic circuits, Principles of signals and system

COURSE EDUCATIONAL OBJECTIVES:

1. To provide various Amplitude modulation and demodulation systems.
2. To provide various Angle modulation and demodulation systems.
3. To provide some depth analysis in noise performance of various receiver.
4. To study some basic information theory with some channel coding theorem.

COURSE OUTCOME:

1. Understand and analyze the concept of amplitude modulation technique.
2. Understand and analyze the concept of angle modulation technique.
3. Understand the application of Probability & Random variables in various noise measurements.
4. Understand the noise performance in AM & FM receivers
5. Apply the various types of information theory ,mutual information and channe coding theorems.

COURSE CONTENT :

UNIT I Amplitude Modulation Systems **9**

Review of Spectral Characteristics of Periodic and Non-periodic signals; Generation and Demodulation of AM/ DSBSC/ SSB and VSB Signals; Comparison of Amplitude Modulation Systems; AM receivers – TRF/ Super heterodyne receivers; Frequency Translation.

UNIT II Angle Modulation Systems **9**

Phase and Frequency Modulation; Single tone/ Narrow Band and Wideband FM; Transmission Bandwidth; Generation and Demodulation of FM Signal. FM receivers/ FDM

UNIT III Noise Theory **9**

Review of Probability/ Random Variables and Random Process; Guassian Process; Noise – Shot
noise/ Thermal noise and white noise; Narrow band noise ; Noise Equivalent Bandwidth; Noise
temperature; Noise Figure.

UNIT IV Performance Of CW Modulation Systems **9**

SNR; Noise in DSBSC systems using coherent detection; Noise in AM system using envelope detection and its FM system; FM threshold effect; Pre-emphasis and De-emphasis in FM; Comparison of performances.

UNIT V Information Theory **9**

Discrete Messages and Information Content/ Concept of Amount of Information/ Average information/ Entropy/ Information rate/ Source coding to increase average information per bit/ Shannon-Fano coding/ Huffman coding/ Lempel-Ziv (LZ) coding/ Shannon's Theorem/ Channel Capacity/ Bandwidth- S/N trade-off/ Mutual information and channel capacity/ rate distortion theory/ Lossy Source coding.

TOTAL = 45 periods

LEARNING RESOURSES :

Text Books :

Dennis Roddy & John Coolen - Electronic Communication (IV Ed.)/ Prentice Hall of India.

Herbert Taub & Donald L Schilling – Principles of Communication Systems(3rd Edition) – Tata McGraw Hill/ 2008.

Reference Books :

1. Simon Haykin/ Communication Systems/ John Wiley & sons/ NY/ 4th Edition/ 2001.
2. Bruce Carlson - Communication Systems. (III Ed.)/ Mc Graw Hill.
3. B.P.Lathi/ Modern Digital and Analog Communication Systems/ Third Edition/ Oxfod Press/2007.
4. R.P Singh and S.D.Sapre/ "Communication Systems – Analog and Digital"/ Tata McGraw Hill/ 2nd Edition/ 2007.
5. John G. Proakis/ Masoud Salehi/ Fundamentals of Communication Systems/ Pearson Education/ 2006.

Online Resourses :

1. http://www.talkingelectronics.com/Download%20eBooks/Principles%20of%20electronics/CH-16.pdf
2. http://nptel.ac.in/courses/IIT-MADRAS/Principles_Of_Communication/pdf/Lecture23-24_AngleModulation.pdf
3. http://www.daenotes.com/electronics/communication-system/noise

COURSE CODE: U5ECB14
COURSE NAME: MICROPROCESSORS AND MICROCONTROLLERS

L	T	P	C
3	1	0	4

PRE-REQUISITE:

Fundamentals of Computer, Fundamentals of Computer lab, Digital System Design, Digital System Design Lab.

COURSE EDUCATIONAL OBJECTIVES:

Students undergoing this course are exposed to:

1. The internal organization, addressing modes and instruction sets of 8085 processor.
2. The various functional units of 8051 microcontroller.
3. Develop assembly language program by using 8051 Instruction sets and addressing modes.
4. The various peripheral such as 8255, 8279, 8251, 8253 and 8259.
5. Microcontroller system design for various applications.

COURSE OUTCOMES:

1. Explain the internal organization, addressing and instruction sets of 8085 processor
2. Explain the architecture and functional block of 8051 microcontroller Understand and analyze the various interfacing devices
3. Develop an embedded C and ALP in 8051 microcontroller using the internal functional blocks for the given specification
4. Explain the interfacing of various peripherals devices such as 8255, 8279, 8251, 8253 and 8259.
5. Design real time system using microcontroller for the given specification.

COURSE CONTENT:

UNIT I 8085 CPU **Lecture 9 + Tutorial 3**

8085 Architecture – Memory interfacing – I/O interfacing- Timing Diagram- Instruction Set- Addressing modes – Assembly language programming.

UNIT II-8051 ARCHITECTURE **Lecture 9 + Tutorial 3**

Architecture – memory organization –Timers - Interrupts - I/O ports, Interfacing I/O Devices – Serial Communication.

UNIT III 8051 PROGRAMMING **Lecture 9 + Tutorial 3**

Addressing modes -instruction set -Assembly language programming and C Programming– Timer Counter Programming – Serial Communication Programming Interrupt Programming.

UNIT IV PERIPHERAL DEVICES **Lecture 9 + Tutorial 3**

Memory Interfacing and I/O interfacing – parallel peripheral Interface (8255) - Timer / Counter (8253) - Keyboard and Display Controller (8279)- USART (8251)- Interrupt Controller (8259).

UNIT V MICROCONTROLLER SYSTEM DESIGN **Lecture 9 + Tutorial 3**

Temperature control system- Motor speed control system – Traffic light System – Elevator system-Data Acquisitions system

LEARNING RESOURCES:

Text Books

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 4th Edition , Penram International Publishing , New delhi, 2000

2. A.K Ray & K.M. Burchandi, Advanced Microprocessor and peripherals Architectures, Programming and interfacing “, TMH, 2002 reprint.

3. Md. Ali Mazadi and Janice Gillispe Mazidi, The 8051 microcontroller and embedded systems, pearson education Asia, New Delhi

Reference Books

1. Kenneth J Ayala, The 8051 Microcontroller Arcchitecture Programming and Application, 2nd Edition, Penram International Publishers (India)

2. M. Rafi Quazzaman , Microprocessor Theory and Application: Intel and Motorola prentice Hall of India.

Online Learning:

1.http://hed.cengage.co.in/section/academic-professional/engineering-computer-science/electrical-elecronics-communication-engineering/22/the-8086-microprocessor-programming-interfacing-pc-with-cd-1e/9788131501801

COURSE CODE : U5ECB15
COURSE NAME : TRANSMISSION LINES AND WAVEGUIDES

L	T	P	C
3	1	0	4

PRE-REQUISITE:

Electro Magnetic Fields.

COURSE EDUCATIONAL OBJECTIVES:

The subject aims to provide the student with:

1. To understand the fundamental concepts of transmission lines and waveguides
2. To understand the essentials of impedance matching and calculates the impedance and admittance using the Smith chart
3. To analyze and design of waveguides
4. To analyze and design rectangular waveguide and cavity, dielectric waveguides.
1. To analyze and design circular waveguide and cavity, dielectric waveguides.

COURSE OUTCOMES

On successful completion of this course students will be able to

1.Understand meaning and use of fundamental transmission line concepts, travelling of standing waves , wavelength, attenuation

2.Compute the cutoff frequency, Phase constant, group and phase velocity, guiding wavelength of each wave guide.

3.Able to evaluate the smith chart and its use for fundamental transmission line calculation

4.Able to evaluate TE,TM modes in rectangular and circular waveguides

5.Able to evaluate TE,TM modes in circular wave guide and cavity resonator.

COURSE CONTENT:

UNIT I Fundamentals of Transmission Line Theory Lecture 9 + Tutorial 3

Different types of transmission lines –Primary and Secondary Constants of transmission line. General Solution of the transmission line, infinite line – reflection coefficient – wavelength and velocity of propagation. Waveform distortion – distortion less transmission line – The telephone cable – Inductance loading of telephone cables. Input impedance of lossless lines – reflection on a line not terminated by Zo - Transfer impedance – reflection factor and reflection loss.

UNIT II Line At High Frequencies Lecture 9 + Tutorial 3

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, single stub matching and double stub matching.

UNIT III Guided Waves **Lecture 9 + Tutorial 3**

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 – Wave impedances.

UNIT IV Rectangular Waveguides **Lecture 9 + Tutorial 3**

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 waveguide – Attenuation of TE and TM modes in rectangular waveguides – Wave impedances

UNIT V Circular Wave Guides and Resonators **Lecture 9 + Tutorial 3**

Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide –Microwave cavities, Rectangular cavity resonators, circular cavity resonator.

TOTAL: 45+15(Tutorial) = 60 periods

LEARNING RESOURCES:

Text Books:

1. J.D.Ryder "Networks, Lines and Fields", PHI, New Delhi, 2003. (Unit I & II)
2. E.C. Jordan and K.G.Balmain "Electro Magnetic Waves and Radiating System, PHI, New Delhi, 2003. (Unit III, IV & V)

Reference:

1. Ramo, Whineery and Van Duzer: "Fields and Waves in Communication Electronics" John Wiley, 2003.
2. David M.Pozar: Microwave Engineering – 2nd Edition – John Wiley.
3. David K.Cheng,Field and Waves in Electromagnetism, Pearson Education, 1989.

Online Resources :

1. http://www.dxzone.com/catalog/transmission lines/
2. http://www.engr.sjsu.edu/rkwok/EE172/transmission_lines.pdf

COURSE CODE: U5BAA02

L	T	P	C
3	0	0	3

COURSE NAME: TOTAL QUALITY MANAGEMENT

PRE-REQUISITE:

COURSE EDUCATIONAL 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:

1. Understand the Total Quality Management concept and the various tools available to achieve Total Quality Management.
2. Ability to know the principle and methodologies off quality management.
3. Understand the various process and capability procedures.
4. Evaluate various tools and techniques for management
5. Identify ISO certification process and Information technology

COURSE CONTENT :

UNIT I Introduction To Quality Management 9

Definitions – TOM framework/ benefits/ awareness and obstacles. Quality – vision/ mission and policy statements. Customer Focus – customer perception of quality/ Translating needs into requirements/ customer retention. Dimensions of product and service quality. Cost of quality.

UNIT II Principles & Philosophies Of Quality Management 9

Overview of the contributions of Deming/ Juran Crosby/ Masaaki Imai/ Feigenbaum/ Ishikawa/ Taguchi/ Shingeo and Walter Shewhart. Concepts of Quality circle/ Japanese 5S principles and 8D methodology.

UNIT III Statistical Process Control & Process Capability 9

Meaning and significance of statistical process control (SPC) – construction of control charts for variables and attributed. Process capability – meaning/ significance and measurement – Six sigma concepts of process capability.

Reliability concepts – definitions/ reliability in series and parallel/ product life characteristics curve.Total producti9ve maintenance (TMP) – relevance to TQM/ Terotecchnology. Business process re-engineering (BPR) – principles/ applications/ reengineering process/ benefits and limitations.

UNIT IV Tools & Techniques For Quality Management 9

Quality functions development (QFD) – Benefits/ Voice of customer/ information organization/ House of quality (HOQ)/ building a HOQ/ QFD process.

Failure mode effect analysis (FMEA) – requirements of reliability/ failure rate/ FMEA stages/ design/ process and documentation. Taguchi techniques – introduction/ loss function/ parameter and tolerance design/ signal to noise ratio.Seven old (statistical) tools. Seven new management tools. Bench marking and POKA YOKE.

UNIT V Quality Systems Organizing & Implementation 9

Introduction to IS/ISO 9004:2000 – quality management systems – guidelines for performance

improvements. Quality Audits.

TQM culture/ Leadership – quality council/ employee involvement/ motivation/ empowerment/ recognition and reward.

Information technology – computers and quality functions/ internet and electronic communications. Information quality issues.

TOTAL : 45 periods

LEARNING RESOURCES :

Text Books :

1. Dale H.Besterfield et al/ Total Quality Management/ Thrid edition/ Perarson Education (First Indian Reprints 2004)
2. Shridhara Bhat K/ Total Quality Management – Text and Cases/ First Edition 2002/ Himalaya Publishing House.

Reference Books:

1.William J.Kolarii/ Creating quality/ Mcgraw Hill/ 1995
2. Poornima M.Charantimath./ Total quality management/ Pearson Education/ First Indian Reprint 2003.
3. Rose J.E. Total Quality Management/ Kogan Page India Pvt Ltd/ 1993.
4. Indian standard – quality management systems – Guidelines for performance improvement (Fifth Revision)/ Bureau of Indian standards/ New Delhi.

L	T	P	C
3	0	0	3

COURSE CODE : U5CSB15
COURSE NAME : DATA COMMUNICATION AND COMPUTER NETWORKS

PRE-REQUISITE:
Fundamentals of Computer

COURSE EDUCATIONAL OBJECTIVES:
1. To expose the students to the basic principles of the technology of data communications and networking.
2. Provide the student with a conceptual foundation for the study of data communications using the open system interconnection (OSI) layered architecture model.
3. Ability to have a good working knowledge of communication technology.

COURSE OUTCOMES:
1.Apply the concepts, functionalities, standards and technologies involved with data communication.
2.Analyze the functions of the seven layers of the OSI reference model.
3.Perform link level analysis including error detection, error control and flow control.
4.Identify and implement how routing is carried out in large open networking environment
5.Analyze the functions of upper OSI layers.

COURSE CONTENT

UNIT I INTRODUCTION TO DATA COMMUNICATION L-9

Data Communication: Data Communication system components, Networks, Protocols - Standard making organizations - Data rate and Channel capacity - Encoding and Digital data communication techniques-Concepts of source coding and channel coding - Asynchronous and Synchronous transmission - Comparison of bit / baud for various keying technique ASK, PSK, FSK, QAM - Interfaces and modems - Digital data transmission - Parallel and Serial DTE / DCE interface data terminal equipment, data circuit terminating equipment - Standards RS 232, Other interface standards EIA 449, EIA 530, X.21, Transmission rate of modems, Modem standards.

UNIT II NETWORK TOPOLOGY & PHYSICAL LAYER L-9

Computer Networks: Network Structure - Network Architecture - Line configuration - Topology of networks - Transmission modes - Categories of Networks - Inter-Networks - OSI model - Functions of different layers - Physical layer - Switching: Circuit switching, Packet switching, Message switching - Network layer - Connection oriented and connectionless services. Local area network - Networking and inter-networking devices - Repeater - Bridges - Routers - Gateways - Ethernet - Token bus - Token ring - FDDI comparison - LAN controller.

UNIT III DATA LINK LAYER AND ITS FUNCTIONS L-9

Types of errors and detection, redundancy, VRC, LRC, CRC techniques - Error correction - Forward and backward error correction - Single bit and multi bit error correction - Hamming code. Data link control: Need for data link control - Line discipline, ENQ / ACK, Flow control stop and wait sliding window protocol, Error control, ARQ, Stop and wait ARQ,

Sliding window ARQ Protocols: Asynchronous and Synchronous communications - Asynchronous and Synchronous Protocol - Character oriented protocol, BSC, bit oriented protocols - HDLC frames - Link access procedures - X.25 Protocol.

UNIT IV NETWORK LAYER AND ITS FUNCTIONS L-9

Network layer design issues, Congestion Control algorithm, Routing algorithm - Transport layer - Design issues - Duties of the Transport layer, Connection management - OSI Transport Protocol - Transport Protocol data unit.

UNIT V UPPER OSI LAYERS AND ITS FUNCTIONS L-9

Session layer: Session and Transport initialization - Synchronization points - Session Protocol Data unit .Presentation layer : Translation - Encryption / Decryption, Substitution and transposition Ciphers, Data Encryption Standards (DES), DES Chaining, Breaking DAS, Public key cryptography, Authentication - Data Compression. Application layer: Message handling systems - Presentation concepts – SNMP-Abstract syntax notation.1 (ASN.1), structure of management, Protocols File Transfer Access and Management (FTAM) - Virtual Terminal (VT) - Directory services - Common Management Information Protocol - TCP/IP: TCP/IP, UDP.

TOTAL: 45 periods

LEARNING RESOURCES:

Text Books:

1. Behrouz Forouzan, “Introduction to Data Communications and Networking”, Tata McGraw Hill, 2nd Edition, 2001.
2. Computer Networks by Andrew Tanenbaum, 2000, ISBN: 0133499456.

Reference:

1. William Stallings, “Data and Computer Communications”, PHI, 5th Edition, 1997.
2. William Schewber ,“Data Communication”, McGraw Hill, 1987.
3. Tanenbaum, “Computer Networks”, PHI, 3rd Edition, 1996

Online Resources:

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this resource.

1. http://nptel.iitm.ac.in/
2. http://www.pearson.ch/1471/9780130138286/Introduction-to-Data-Communications-and.aspx
3. http://elecom.physics.auth.gr/Gr/Courses/Telecom/Chapter_1.pdf
4. .http://eng.uok.ac.ir/abdollahpouri/Network/Data%20and%20Computer%20Comm%208E.pdf
5. **www.books.google.co.in** › Computers › Networking › General

COURSE CODE : U5ECB16

L	T	P	C
0	0	3	2

COURSE NAME : DIGITAL SIGNAL PROCESSING LAB

PRE-REQUISITE:

Signals & Systems.

COURSE EDUCATIONAL OBJECTIVES:

6. To introduce the concepts in internal programming model of Intel family of microprocessors.
7. To introduce the architecture programming and interfacing of 16 bit microcontrollers.

COURSE OUTCOME:

1. Practically implement the continuous signals and discrete signals.
2. Practically implement the sampling and aliasing concepts for different signals.
3. Calculate and analyze the continuous and discrete signals using FFT algorithm.
4. Practically design the FIR and IIR filters.
5. Implement the different types of signals and filters using the TMS320CXX DSP processor both practically and theoretically.

LIST OF EXPERIMENTS

CYCLE -1

1. Study of various Addressing Modes of DSP using Simple Programming Examples
2. Sampling of Input Signal and Display
3. Design & Implementation of FIR Filter using MATLAB
4. Generation of Signals using MATLAB
5. Linear and Circular Convolution of Two Sequences using MATLAB

CYCLE-2

6.Sampling and Effect of Aliasing using MATLAB
7.Design of IIR Filters using MATLAB
8.Calculation of FFT of a Signal using MATLAB
9.FIR Filter Implementation using TMS320XX Processor
10.IIR Filter Implementation using TMS320XX Processor

LIST OF EQUIPMENTS:

For a Batch of students of 30

Sl.No	Equipment Name	Quantity
1.	Computers	30
2.	Matlab Software	30
3.	Code Composer Studio Software	15
4.	TMS320XX Processor	15

L	T	P	C
0	0	3	2

COURSE CODE: U5ECB17

COURSE TITLE: MICROPROCESSORS AND MICROCONTROLLERS LAB

PRE-REQUISITE:
Microprocessors and Microcontroller laboratory helps the students to develop their knowledge in the assembly and C language programming.

COURSE OBJECTIVE:

Students undergoing this courses will be exposed with:

- Functional Concepts of assembly language programme in 8085 and 8051.
- Concepts of interfacing with microprocessor and microcontroller using assembly language programming.
- Concepts of embedded C language programme for 8051 microcontroller using Keil Complier

COURSE OUTCOMES:

Student will be able to**:**

1. Develop and Implement assembly language program for performing basic mathematical manipulation using 8085 microprocessor kit Identify and debug their assembly language programs.
2. Develop and Implement assembly language program for performing basic mathematical manipulation using 8051 microcontroller kit.
3. Apply the knowledge timer and interrupts in 8051 microcontroller.
4. Demonstrate the timer and traffic light interfacing programme using 8085
5. Demonstrate the Stepper motor and Keyboard interfacing program using 8051

COURSE CONTENT:
LIST OF EXPERIMENTS
CYCLE-I

1. Program for Arithmetic operations (8085)
2. Program for Arithmetic operation and Bit manipulation (8051)
3. Program for square root and square of the given input.
4. Timer programming using keil.
5. Serial port programming using keil.

CYCLE-II

1. Interrupt program using keil.
2. Program for interfacing of keyboard with 8051.
3. Program for interfacing of stepper motor with 8051.
4. Program for interfacing the timer with 8085.
5. Program for the traffic light controller using 8085.

LIST OF EQUIPMENT:

For a Batch of students of 30

S.NO	EQUIPMENT	QUANTITY
1	8086 Microprocessor Kit	30
2	MASM Software	30
3	8279 interfacing Kit	22
4	8253 interfacing Kit	22
5	8255 interfacing Kit	22
6	ADC &DAC interfacing Kit	15
7	Stepper Motor	5
8	DC Motor	10
9	8051 Microcontroller kit	21

COURSE CODE: U5CSB17
COURSE NAME: NETWORKS LAB

L	T	P	C
0	0	3	2

PRE-REQUISITE :

Data Communication and Computer Networks

COURSE EDUCATIONAL OBJECTIVES:

- To expose the students to the basic principles of the technology of data communications and networking.
- To Provide the student with a conceptual foundation of different protocols and network components
- Ability to have a good working knowledge of communication technology using NETSIM

COURSE OUTCOME:

On successful completion of this course, the student will be able to

- Applying the knowledge of address resolution protocols, bit stuffing and the cyclic redundancy check.
- Analyze and implement the performance of sliding window and border gateway protocols
- Analyze the concept of transmission control and file transfer protocols.
- Implementation of Lan and Routing protocol.
- Implementation and synthesize the performance and need of network simulators

LIST OF EXPERIMENTS

CYCLE -1

1. Simulation of ARP / RARP.
2. Write a program that takes a binary file as input and performs bit stuffing and CRC Computation.
3. Simulation of Sliding-Window protocol
4. Simulation of BGP routing protocol.
5. Develop a Client – Server application for chat.

CYCLE-2

6. Write a Client to download a file from a HTTP Server.
7. Develop an application for file transferring Protocol .
8. Verifying LAN protocols.
9. Implementation of distance vector routing and link state routing algorithm.
10. Study of Network Simulators like NS2/Glomosim / OPNET.

LIST OF EQUIPMENTS:

S.No.	Description of Equipment	Quantity required	Quantity available
1	PC	30	30
2	Network Simulator Software	30	30
3	C , JAVA Complier	30	30

B.TECH

ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum & Syllabus
Regulation 2013

SEMESTER – VI

[Regular]

THEORY AND LAB COURSES

SEMESTER VI

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U6ECB18	Digital Communication Techniques	3	0	0	3
U6ECB19	Advanced Controller Architecture	3	0	0	3
U6ECB20	Antenna & Wave Propagation	3	1	0	4
U6ECB21	Mobile Communication	3	0	0	3
U6CSB10	Embedded System & RTOS	3	0	0	3
UEGEB13	Integrated Product Development	3	0	0	3
PRACTICAL					
U6ECB22	Advanced Controller Lab	0	0	3	2
U6ECB23	Communication Systems Lab	0	0	3	2
U6ENB01	Proficiency in English	0	0	3	2
Total Credits					25

L – Lecture; T – Tutorial; P – Practical; C - Credit

L	T	P	C
3	0	0	3

COURSE CODE: U6ECB18
COURSE NAME: DIGITAL COMMUNICATION TECHNIQUES

PRE-REQUISITES:
Digital Signal Processing, Engineering Mathematics-I, Principles of signals and systems.

COURSE EDUCATIONAL OBJECTIVES:
The subject aims to provide the student with:

- Knowledge about the pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- About the baseband pulse transmission, which deals with the transmission of pulse-amplitude, modulated signals in their baseband form.
- Error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

COURSE OUTCOMES:
On successful completion of this course the student will be able to

1. Explain the concept of pulse modulation and various forms of coding schemes.
2. Calculate the distortions parameters for better baseband transmission for the given specification using Nyquist criterion
3. Describe the characteristics of various data transmission schemes such as QPSK,BPSK,FSK&MSK.
4. Determine the error in the communication system using linear and convolutional codes.
5. Describe the methods of various communication system such as direct sequence and frequency hop spread spectrum.

COURSE CONTENT:

UNIT I Pulse Modulation **L-9**

Sampling process –PAM- other forms of pulse modulation – –Quantization –PCM- Noise considerations in PCM Systems-TDM (t1 multiplexing)- Digital multiplexers-Virtues, Limitation and modification of PCM-Delta modulation –Linear prediction –differential pulse code modulation – Adaptive Delta Modulation.

UNIT II Baseband Pulse Transmission **L-9** Matched Filter- Error Rate due to noise –Intersymbol Interference- Nyquist's criterion for Distortionless Base band Binary Transmission- Correlative level coding –Baseb and M-ary PAM transmission –Adaptive Equalization –Eye patterns

UNIT III Passband Data Transmission **L-9**

Gram-Schmidt Orthogonalization Procedure; Geometric Interpretation of Signals; Correlation Receiver; Introduction – Pass band Transmission model- Generation, Detection, Signal space diagram, bit error probability and Power spectra of BPSK, QPSK, FSK and

MSK schemes –Differential phase shift keying – Comparison of Digital modulation systems using a single carrier – Carrier and symbol synchronization.

UNIT IV Error Control Coding **L-9**

Discrete memoryless channels – Linear block codes - Cyclic codes - Convolutional codes – Maximum likelihood decoding of convolutional codes-Viterbi Algorithm, Trellis coded Modulation

UNIT V Spread Spectrum Modulation **L-9**

Pseudo- noise sequences –a notion of spread spectrum – Direct sequence spread spectrum with coherent binary phase shift keying – Signal space Dimensionality and processing gain – Probability of error – Frequency –hop spread spectrum

TOTAL :45 periods

LEARNING RESOURCES

TEXT BOOK

1. Simon Haykins, "Communication Systems" John Wiley, 4th Edition, 2001

REFERENCE BOOK

1. Sam K.Shanmugam "Analog & Digital Communication" John Wiley.
2. John G.Proakis, "Digital Communication" McGraw Hill 3rd Edition, 1995
3. Taub & Schilling , "Principles of Digital Communication " Tata McGraw-Hill" 28th reprint, 2003

ONLINE RESOURCES:

REQUIRED RESOURCES: NPTEL

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Data%20Communication/Learning%20Material%20-%20DataCommunication.pdf
2. http://www.sp4comm.org/docs/chapter12.pdf

L	T	P	C
3	0	0	3

COURSE CODE : U6ECB19
COURSE NAME : ADVANCED CONTROLLER ARCHITECTURE
PREREQUISITE :

Fundamentals of Computing, Fundamentals of computing Lab, Digital System Design, Digital System Design Lab, Microprocessor and Microcontroller, Microprocessor & Microcontroller Lab

COURSE EDUCATIONAL OBJECTIVES :

Students undergoing this course are exposed to:

- Architecture and programming concepts of PIC Microcontroller.
- Design of real time system using PIC Microcontroller.
- Basic concepts of RISC and ARM processor.

COURSE OUTCOMES :

Upon the successful completion of the course, learners will be able to

1. Explain the architecture ,memory organisation and programming of PIC microcontroller
2. Develop an embedded C program using the internal functional blocks of PIC microcontroller for the given requirement.
3. Design a real time system for motor control and data acquisition system for the given specification.
4. Explain the architecture and functions of RISC processor
5. Explain the architecture and instruction set of ARM processor

COURSE CONTENT :

UNIT I PIC Microcontroller **9**

Architecture – memory organization – addressing modes – instruction set – PIC programming in Assembly & C –I/O port, Data Conversion, RAM & ROM Allocation

UNIT II Peripheral of PIC Microcontroller **9**

Timers – Interrupts, I/O ports- I^2C bus-A/D converter-UART- ADC, DAC and Sensor Interfacing –Flash Memory.

UNIT III System Design – Case Study **9**

Interfacing LCD Display – Keypad Interfacing - Generation of Gate signals for converters and Inverters - Motor Control – Controlling AC appliances –Measurement of frequency - Stand alone Data Acquisition System.

UNIT-IV Introduction to ARM **9**

The RISC revolution – Characteristics of RISC Architecture – The Berkeley RISC – Register Windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction

UNIT V ARM Processor fundamental **9**

Architecture –Registers -ARM Processor families - instructions set –Data processing instructions-Branch Instruction-Load and store Instruction- status register Instruction.

TOTAL: 45 periods

LEARNING RESOURCES:

TEXT BOOKS:

1. Muhammad Ali Mazidi, Rolin D. McKinley, Danny Causey ‘ PIC Microcontroller and Embedded Systems using Assembly and C for PIC18’, Pearson Education 2008
2. Andrew.Sloss,Dominic Symes and Chris Wright, ARM System Developers Guide, Morgan Kaufmann Publishers

REFERENCE BOOKS:

1. John Iovine, ‘PIC Microcontroller Project Book ’, McGraw Hill 2000
2. Davil Seal, ARM Architecture Reference manual, Addison-Wesley second edition

ONLINE RESOURCES :

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. http://en.wikipedia.org/wiki/PIC_microcontroller
2. NPTEL

COURSE CODE : U6ECB20
COURSE NAME : ANTENNA AND WAVE PROPAGATION
DESIGNED FOR YEAR/SEM: III/VI

L	T	P	C
3	1	0	4

PRE-REQUISITES:

- Electro Magnetic Fields.
- Transmission Lines and Waveguides.

COURSE EDUCATIONAL OBJECTIVES:

The subject aims to provide the student with:

- The knowledge of various antennas, arrays and radiation patterns of antennas.
- The basic working of antennas
- Various techniques involved in various antenna parameter measurements.
- The radio wave propagation in the atmosphere
- The applications of the electromagnetic waves in free space.

COURSE OUTCOMES:

Upon the successful completion of the course, learners will be able to

1. Explain antenna terminologies and their radiation characteristics
2. Explain the construction and operation of arrays, loop antenna & helical antenna.
3. Design the various types of travelling wave antenna such as rhombic,coupled antennas for the given specification using yagiuda and log periodic antenns.
4. Design an aperture and lens antenna for the given specification using monopole, dipole and slot antennas.
5. Explain the different wave propagation levels in atmosphere and their characteristics.

COURSE CONTENT:

UNIT IAntenna Fundamentals & Radiation Fields 9+3

Structure of antenna, Classification of types antennas, Radiation Resistance, Gain,Directivity, Directivity Gain, Power Gain, Beam Width, Band width, Effective Area, Effective Length, Radiation Pattern, Field Pattern, Power Pattern, Radian, Streadian, Beam Solid Angle, Polarization and its types, Radiation Resistance of current, Relation between gain, effective length and radiation resistance. Derivation of effective aperture, FRIIS transmission formula .

Radiation Fields : Concept of Vector Potential , Modification for time varying retarded case, Fields associated with hertizian dipole antenna , power radiated and radiation resistance of hertizian current element , effective area of hertizian antenna. Fields associated with oscillating electric dipole antenna, power radiation and radiation resistance of full wave dipole antenna, effective area of full wave dipole antenna.

UNIT II Arrays Of Point Sources 9+3

Classification, Expression of electric field for two element array .Broad side array maximum, minimum, HPBW, Directivity. End fire array maximum, minimum, HPBW, Directivity. Uniform linear array , Method of pattern multiplication, Binomial Array.

Loop antenna radiation fields and radiation resistance. Helical antenna normal mode and Axial mode operation.

UNIT IIITravelling Wave Antenna 9+**3**

Radiation from a traveling wave on a wire.Analysis of Rhombic antenna .Design of rhombic antennas.

Coupled Antennas: Self and mutual impedance of antennas .Two and three element yagiuda antennas, log periodic antenna. Reason for feeding from end with shorter dipoles and need for transposing the lines .Effects of decreasing alpha.

UNIT IV AperatureAnd Lens Antennas **9+3**

Equivalence of fields of a slot and complementary dipole.Relation between dipole and slot impedances.Method of feeding slot antennas. Horn Antennas, reflector type of antennas (dish antennas). Dielectric lens and metal plane lens antennas, lumeberg lens, spherical waves and biconical antenna.

UNIT V Propagation **9+3**

The three basic types of propagation: Ground wave propagation , Sky wave propagation , Space wave propagation .

Ground wave propagation: Attenuation characteristics for ground wave propagation. Calculation of field strength at a distance.

Sky wave propagation : Structure of the ionosphere , Effective dielectric constant of ionized region. Mechanism of refraction . Refractive index, Critical frequency , Skip distance, Effect of earth's magnetic field. Energy loss in the ionosphere due to collisions Maximum usable frequency .Fading and Diversity reception.

Space wave propagation : Reflection from ground for vertically and horizontally polarized waves. Reflection characteristics of earth.Resultant of direct and reflected ray at the receiver. Duct Propagation.

TOTAL= 60 periods

LEARNING RESOURCES:

Text Books

1. John D.Kraus, Ronald J.Marhefka "Antennas for all Applications" Fourth Edition, Tata McGraw- Hill, 2006.
2. K.D.Prasad "Antenna and wave propagation", Satya prakashan,1996.

Reference Books

1. Constantine A. Balanis "Antenna Theory: Analysis and Design", John Wiley publishers,2003.
2. H.Griffiths, J.Encianas, A.Papiernik& Serge Drabowitch "Modern Antennas" Chapman & Hall, 1998.

L	T	P	C
3	0	0	3

U6ECB44 EMBEDDED DESIGN AND RTOS

UNIT I EMBEDDED DESIGN LIFE CYCLE 9

Product specification – Hardware / Software partitioning – Detailed hardware and software design – Integration – Product testing – Selection Processes – Microprocessor Vs Micro Controller – Performance tools – Bench marking – RTOS Micro Controller – Performance tools – Bench marking – RTOS availability – Tool chain availability – Other issues in selection processes.

UNIT II PARTITIONING DECISION 9

Hardware / Software duality – coding Hardware – ASIC revolution – Managing the Risk – Co-verification – execution environment – memory or ganization – System startup – Hardware manipulation – memory mapped access – speed and code density.

UNIT III INTERRUPT SERVICE ROUTINES 9

Watch dog timers – Flash Memory basic toolset – Host based debugging – Remote debugging – ROM emulators – Logic analyser – Caches– Computer optimisation – Statistical profiling

UNIT IV OVERVIEW OF RTOS 9

RTOS Task and Task state - Process Synchronisation-Message queues – Mail boxes - pipes – Critical section – Semaphores – Classical synchronisation problem – Deadlocks.

UNIT V RTOS APPLICATION DOMAINS 9

RTOS for Image Processing – Embedded RTOS for voice over IP – RTOS for fault Tolerant Applications – RTOS for Control Systems.

Text Books:

1. Arnold S. Berger – “Embedded System Design”, CMP books, USA 2002.
2. Raj Kamal, “Embedded Systems- Architecture, Programming and Design” Tata McGraw Hill, 2006.

Reference Books:

1. Herma K., “Real Time Systems – Design for distributed Embedded Applications”, Kluwer Academic, 1997.
2. C.M. Krishna, Kang, G.Shin, “Real Time Systems”,McGraw Hill, 1997.
3. Sriram Iyer, “Embedded Real time System Programming”

COURSE CODE : U6ECB21
COURSE NAME : MOBILE COMMUNICATION

L	T	P	C
3	0	0	3

PREREQUISITE COURSES:

Communication systems and techniques, Digital communication principles

COURSE EDUCATIONAL OBJECTIVES :

Students undergoing this course are exposed to:

- Mobile radio communication principles and techniques
- Recent trends adopted in cellular and wireless systems and standards.

COURSE OUTCOMES :

Upon the successful completion of the course, students will be able to:

1. Explain the cellular concepts and capacity improvement Techniques.
2. .Explain the mobile radio propagation mechanisms and summarize diversity reception techniques
3. Explain the parameters involved in design of base and mobile station.
4. Explain the multiple access techniques and its application.
5. Assess the latest wireless technologies and standards

COURSE CONTENT:

UNIT I INTRODUCTION TO WIRELESS COMMUNICATION **9**

History and evolution of mobile radio communication-Mobile radio systems around the world-Examples of wireless communication-Generations –Frequency reuse – Channel Assignment strategies – Handoff strategies – Interference- Trucking and Grade of service-Improving Coverage and capacity of cellular system .

UNIT II MOBILE RADIO PROPAGATION **9**

Radio wave propagation-Free space propagation model – Basic propagation mechanism-Ground reflection model-Knife edge diffraction model-radar cross section model-Practical Link budget design- Fading. Multipath propagation. Statistical characterization of multipath fading. Diversity Techniques.

UNIT III DESIGN PARAMETERS OF BASE STATION AND MOBILE STATION **9**

Design parameters at the base station: Antenna location-Spacing-height-configuration.
Design parameters at the Mobile unit: Directional antennas -Antenna Connection and Location

UNIT IV MULTIPLE ACCESS SCHEMES **9**

FDMA-TDMA-CDMA-WCDMA-OFDM -MC-CDMA –SDMA

UNIT V WIRELESS SYSTEMS AND STANDARDS. **9**

GSM. 3G-4G (LTE)- NFC systems-WLAN technology- WLL- Hiper LAN- Ad hoc networks- Bluetooth-WIFI. **Total: 45 periods**

Text Books:

1.T.S.Rappaport, "Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.

2.W.C.Y.Lee,"Mobile Communication Design Fundamentals",second edition,john Wiley & sons,1993

Reference:

1. P. Muthu Chidambara Nathan, Wireless Communications, PHI, 2008.
2. W.C.Y. Lee, Mobile Communication Engineering. (2/e), McGraw- Hill, 1998.
3. A. Goldsmith, Wireless Communications, Cambridge University Press, 2005.
4. S.G. Glisic, Adaptive CDMA, Wiley, 2003.
5. R. Blake, " Wireless Communication Technology", Thomson Delmar, 2003.
6. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.
7. A.F. Molisch, Wireless Communications, Wiley, 2005.

Online resources

1. https://www.youtube.com/watch?v=cyT6ReCEosM
2. https://www.youtube.com/watch?v=XHR51uJOAh0
3. https://www.youtube.com/watch?v=KymIDyQiXZI
4. https://www.youtube.com/watch?v=DHA72EKL_vc
5. https://www.youtube.com/watch?v=CUyF0YGIA5Y&list=PLat4ZOL5VjH8EqiF0XaNFxbxt5ayDIX10

COURSE CODE: UEGEB13
COURSE NAME: INTEGRATED PRODUCT DEVELOPMENT

L	T	P	C
3	0	0	3

PREREQUISITE:
Basic Electrical and Electronics Engineering.

COURSE EDUCATIONAL OBJECTIVES :
Students undergoing this course are expected to:

- Understand the concepts of tools and techniques in the Integrated Product Development area of the Engineering Services industry.
- Relate the engineering topics into real world engineering applications.

COURSE OUTCOMES :

Upon the successful completion of the course, learners will be able to

1. Summarize the various trends affecting product decision
2. Identify the requirements to create new product
3. Compare different techniques involved in design creation and design testing
4. Rephrase the methods of model creation and integration between software and hardware.
5. Illustrate the need of end of life and patenting.

COURSE CONTENTS

UNIT I: FUNDAMENTALS OF PRODUCT DEVELOPMENT L-9

Global Trends Analysis and Product decision: Types of various trends affecting product decision - Social Trends-Technical Trends- Economical Trends Environmental Trends-Political/ Policy Trends- PESTLE Analysis.

Introduction to Product Development Methodologies and Management: Overview of Products and Services- Types of Product Development- Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management .

UNIT II: REQUIREMENTS AND SYSTEM DESIGN L-9

Requirement Engineering: Types of Requirements- Requirement Engineering- Analysis - Traceability Matrix and Analysis- Requirement Management.

System Design &Modeling: Introduction to System Modeling- introduction to System Optimization- System Specification-Sub-System Design- Interface Design.

UNIT III: DESIGN AND TESTING L-9

Conceptualization -Industrial Design and User Interface Design- Introduction to Concept generation Techniques-Concept Screening & Evaluation- Concept Design- S/W Architecture- Hardware Schematics and simulation-

Detailed Design: Component Design and Verification- High Level Design/Low Level Design of S/W Programs- S/W Testing-Hardware Schematic- Component design- Layout and Hardware Testing.

UNIT IV: IMPLEMENTATION & INTEGRATION L-9

Prototyping: Types of Prototypes -Introduction to Rapid Prototyping and Rapid Manufacturing.
System Integration- Testing- Certification and Documentation: Introduction to Manufacturing/Purchase and Assembly of Systems- Integration of Mechanical, Embedded and S/W systems- Introduction to Product verification and validation processes - Product Testing standards, Certification and Documentation.

UNIT V: SUSTENANCE ENGINEERING AND BUSINESS DYNAMICS L-9

Sustenance -Maintenance and Repair- Enhancements
Product End of Life (EoL): Obsolescence Management-Configuration Management- EoL Disposal.
The Industry - Engineering Services Industry overview- Product development in Industry versus Academia
The IPD Essentials- Introduction to vertical specific product development processes- Product development Trade-offs- Intellectual Property Rights and Confidentiality- Security and configuration management

TOTAL=45 periods

LEARNING RESOURCES:

Text books:

1. NASSCOM student Handbook "Foundation Skills in Integrated Product Development".
2. Anita Goyal, Karl T Ulrich, Steven D Eppinger, “Product Design and Development “, 4th Edition, 2009, Tata McGraw-Hill Education, ISBN-10-007-14679-9

Reference:

1. 1 George E.Dieter, Linda C.Schmidt, “Engineering Design”, McGraw-Hill International Edition, 4th Edition, 2009, ISBN 978-007-127189-9
2. Kevin Otto, Kristin Wood, “Product Design”, Indian Reprint 2004, Pearson Education,ISBN. 9788177588217
3. Yousef Haik, T. M. M. Shahin, “Engineering Design Process”, 2nd Edition Reprint, Cengage Learning, 2010, ISBN 0495668141
4. Clive L.Dym, Patrick Little, “Engineering Design: A Project-based Introduction”, 3rd Edition, John Wiley & Sons, 2009, ISBN 978-0-470-22596-7
5. Product Design Techniques in Reverse Engineering and New Product Development, KEVIN OTTO & KRISTIN WOOD, Pearson Education (LPE), 2001.
6. The Management and control of Quality-6th edition-James R. Evens, William M Lindsay Pub:son south-western(www.swlearning.com)
7. Fundamentals of Quality control and improvement 2nd edition, AMITAVA MITRA, Pearson Education Asia, 2002.

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U6ECB22	ADVANCED CONTROLLER LABOROTARY

L	T	P	C
0	0	3	2

Prerequisite : Fundamentals of computing, Fundamentals of computing lab, Digital system design, Digital System design lab, Microprocessor and Microcontroller, Microprocessor & Microcontroller Lab.

Course Educational Objectives :

Students undergoing this course will be exposed with:

- Functional concept of 8051 programming using Keil simulator.
- Concepts of interfacing with 8051 microcontrollers using Keil simulator.
- Concept of PIC microcontroller and its peripherals.

Course Outcomes :

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Develop and implement an embedded C program for 8051 microcontroller using the Keil simulator for the given specification.	K3,S3
CO2	Develop and implement an embedded C program for interfacing stepper and DC motor with 8051 microcontroller using Keil simulator for the given specification.	K3,S3
CO3	Demonstrate elevator and music tone generator with 8051 microcontroller using Keil simulator for the given specification.	K3,S3
CO4	Develop and implement an embedded C program for PIC microcontroller using MPlab IDE for the given specification.	K3, S3
CO5	Demonstrate USB and Sensor interface with PIC microcontroller using MPLab IDE for the given specification.	K3, S3

K3- Apply S3- Skill

List of Experiments:

EXPERIMENTS IN 8051 MICROCONTROLLER

1. Simple & Logical Programming
2. Timer programming
3. Serial port programming
4. Interrupts programming
5. I/O Devices interfacing

6. DC Motor control using PWM
7. Elevator interfacing
8. Music tone generator interfacing

EXPERIMENTS IN PIC MICROCONTROLLER

1. PIC I/O Port Programming
2. PIC Timers Interrupt Programming
3. PIC Serial Port Programming
4. LCD Interface
5. Keypad Interface
6. USB Interface
7. ADC Interface
8. Sensor Programming
9. GUI Interface

U6ECB23	COMMUNICATION SYSTEMS LAB

L	T	P	C
0	0	3	2

Prerequisite: electronic circuit's lab, linear integrated circuits lab.

Course Educational Objectives :

1. To provide knowledge and skill about pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of Analog signals.
2. To provide knowledge and skill about baseband pulse transmission, which deals with the transmission of pulse-amplitude, modulated signals in their baseband form.
3. To provide knowledge and skill about error control coding which encompasses techniques for encoding and decoding of digital data streams for their reliable transmission over noisy channels.

Course Outcomes :

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Demonstrate the radiation pattern by conducting experiment in yagi, dipole and square loop antenna for the given specification using front and back ratio method	K3,S3
CO2	Design Amplitude Modulation Detector for the given specification and experimentally demonstrate its Modulation Index using Diode 0A79	K3,S3
CO3	Design Amplitude Modulation for the given specification and experimentally demonstrate its Modulation Index using for various parameters using IC566	K3, S3
CO4	Demonstrate Modulation and demodulation technique of Pulse Amplitude Signals for the given specification and experimentally demonstrate its characteristics by using Sampling and TDM.	K3, S3
CO5	Demonstrate the digital Modulation by conducting experiment for schemes such as FSK, ASK, PSK for the given specification and experimentally demonstrate its characteristics by using carrier modulation technique	K3, S3

K2- Apply S3- Skill

List of Experiments

CYCLE-I

1. To compare the radiation patterns of Yagi, Folded Dipole and Square Loop antennas on a polar plot.

2. Time division multiplexing
3. Characteristics of AM& FM receiver (Selectivity & Sensitivity)
4. Sampling
5. Pulse modulation- PAM / PWM /PPM

CYCLE-II

6. Pulse code modulation
7. Differential pulse code modulation
8. Line coding & Decoding
9. Delta modulation
10. Digital modulation –ASK, PSK, QPSK, FSK

U6ENB01 PROFICIENCY IN ENGLISH LAB

L	T	P	C
0	0	3	2

OBJECTIVES

- Students can learn the body language and mock interviews using training sessions
- To analyze the various audio and video samples using presentation skills
- To implement the team building activity using various leadership and managerial skills.

COURSE OUTCOMES

- Develop interpersonal skills through group discussion.
- Use appropriate nonverbal communications and answer questions effectively.
- Prepare presentations with appropriate language, style, timing and flow.
- Develop Professional and Leadership skills
- Explore various writing styles

1. Group Discussion:

Why is GD part of selection process ? -Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work -Body Language -Mock GD -Video samples

2. Interview Skills:

Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews- Video samples

3. Presentation skills:

Elements of effective presentation – Structure of presentation -Presentation tools –Voice Modulation – Audience analysis -Body language – Video samples-oral presentation- delivery methods and handling of stage fear.

4. Team Building

Understanding the role of Teams in Organizations- Pursuing Team Leadership- Preparing to be a Team Partner- Getting Started with your Team- Managing a Team Diplomatically- Concluding Team Activities.

5. Writing for Employment

Writing a resume - Accepting /Rejecting job offers- Teaching at work- Professional Net Working Sites - Web Conferencing

Beyond the Syllabus:

1. Praksh.P. Verbal and non verbal reasoning, McMillion India Ltd, 3rd Edition, New Delhi, 2010.
2. John, Seely, The Oxford guide to writing and speaking, oxford university press, new delhi, 2011.

REFERENCE BOOKS

1. Thorpe, E, and Thorpe, S, **Objective English**, Pearson Education, Second Edition, New Delhi, 2007.

2. Anderson, P.V, **Technical Communication**, Thomson Wadsworth, Sixth Edition, New Delhi, 2007.

3. Butterfield , Jeff, **Soft Skills For Everyone.** cegage learning, Canada,2011

Web Reference:

1. http://www.lonestar.edu/useful-websites-for-students.htm
2. www.english-for-students.com/
3. www.britishcouncil.org
4. *www.sfsu.edu/~puboff/onestop.htm*

SEMESTER VII

SUB.CODE	SUBJECT	L	T	P	C
THEORY					
U7ECB24	VLSI Design	3	1	0	4
U7ECB25	Fiber Optic Communication	3	0	0	3
U7ECB26	Microwave Engineering	3	0	0	3
*****	Elective – I	3	0	0	3
*****	Elective – II	3	0	0	3
*****	Elective – III	3	0	0	3
PRACTICAL					
U7ECB27	Microwave and Optical Lab	0	0	3	2
U7ECB28	VLSI Design Lab	0	0	3	2
U7ECB29	Mini Project	0	0	6	2
Total Credits					25

Course Code: U7ECB24
Course Name: VLSI DESIGN
Designed for: Year: IV Semester:VII

L	T	P	C
3	1	0	4

Course Educational Objectives :

Students undergoing this course are expected to:

- Study of VLSI design methodology
- Design for testability and design verification.
- Learn methods to improve digital VLSI systems performance: reliability, manufacturability, cost, power, security, etc.
- Learn hardware design language (HDL)

COURSE OUTCOMES

Students undergoing this course are able to

- Explain the physical design of CMOS Technology.
- Explain ASIC design flow and floor planning and testing of ICs.
- Identify the importance of testing and types of fault models.
- Illustrate the Design of programmable logic devices and implementation on FPGA.
- Apply the programming knowledge to write Verilog HDL code.

Pre-requisites:

- Digital System Design

COURSE CONTENT

UNIT I CMOS Technology **9 + 3**

An Overview of silicon semiconductor technology, Basic CMOS technology: n Well , P Well , Twin Tub and SOI process. Circuit Elements: Resistors, Capacitors, EAROM. Latch Up and Prevention. Layout Design rules, Stick Diagram, Physical Design: Basic Concepts, CAD tools.

Physical Design of logic gates: Inverter, NAND, NOR, Design hierarchies.

UNIT II CMOS Chip Design **9 + 3**

Logic Design with CMOS: MOSFETS as switches, Basic logic gates in CMOS and Complex logic gates. Transmission gates: Muxes and latches. CMOS chip design options: full custom ASIC'S, semi custom ASIC and programmable ASIC. Programmable logic structures: 22V10, programming PAL's, Programmable interconnect Reprogrammable GA: Xilinx programmable GA, Features and internal structure of CPLDs, FPGAs, designing with CPLDs and FPGAs. Introduction to IC floor planning and testing, ASIC Design flow.

UNIT III CMOS Testing **9 + 3**

Need for testing, manufacturing test principles, Design strategies for test: design for testability, combinational logic testing, sequential logic testing , fault model types , ATPG , Boundary scan test , built in self test , DFT schemes . Chip level and system level test techniques.

UNIT IV Synchronous Design Using Programmable Devices 9 + 3

EPROM to realize a sequential circuit , Programmable logic devices : ROM, PLA, PAL, PLD and DESIGN , designing a synchronous sequential circuit using a GAL , realization state machine using PLD , FPGA : introduction , Switching matrix , FPGA Xilinx 2000 , Xilinx 3000.

UNIT V Specification Using Verilog HDL 9 + 3

Basic concepts, language features, VLSI design flow , identifiers , arrays , instances , value set , ports , gate delays.

Types of Verilog description – structural gate level RTL, data flow RTL and structural and behavioral RTL descriptions

Structural gate level RTL : Half adder , Full adder , Ripple carry adder, Multiplexer, encoder , decoder, comparator, equality detector , D-latch , D Flip Flop , JK flip flop.

Data flow RTL : Operators, Combinational logic and sequential logic examples.

Structural and behavioral RTL : Delays and Timing controls ,Procedural assignments and conditional assignments, Multiplexer, Combinational logic and sequential logic examples.

TOTAL: 45+15(Tutorial) = 60 periods

LEARNING RESOURCES

TEXT BOOKS

1. Weste & EShraghian : Priciples of CMOS VLSI Design (2 / e) Addison Wesley , 1993.
2. Samir Palnitkar , Verilog HDL – Guide to digital design and synthesis , III edition , Pearson Eduaction , 2003

REFERENCE BOOKS

1. M.J.S.Smith : Application Specific Integrated circuits , Pearson Eduaction, 1997.
2. 2.John M Yarbrough " Digital Logic applications and design " Thomas Learning , 2001 .
3. Neil, " CMOS VLSI DESIGN', PHI,2008.

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Course Code: U7ECB25
Course Name: FIBRE OPTIC COMMUNICATION
Designed for: Year: IV Semester: VII

Pre-Requisite:
Communication system and techniques, Semiconductor devices and circuit,

Link To Other Courses:
Opto- electronics, mobile communication,

Course Educational Objectives:
Student undergoing this course exposed with

- The basics of optical fiber, light propagation and the various types of losses and dispersion.
- The basic concepts and working of various optical sources and detectors.
- The concept of modulation techniques, optical amplifiers and basics of optical fiber link and its components

Course Outcomes:
On successful completion of this course, the learners will be able to

1. Explain the basic structures of optical fiber, types and light propagation
2. Describe the channel impairments such as losses and dispersion mechanism.
3. Explain the principle and operation of the optical sources and detectors such as LASER & APD
4. Compare the various types of modulation and amplification techniques for the given specification
5. Analyze the performance optical fiber link using rise time and link power budget analysis for given scenario

Course Content:

UNIT I Introduction To Optical Fibers L- 9

Introduction to Telecommunications and Fiber Optics, The Evolution of Fiber Optic Systems, Basic Optical Laws and Definitions, Propagation of light inside fiber, Critical-Angle, Numerical-Aperture, Acceptance-Angle ,Cut-off wavelength , V-Number, Mode Field Diameter, Leaky Modes , Single and Multi- Mode Fibers, Fiber Types, Waveguide Equations, Step-Index Fiber Structure, Graded-Index Fiber Structure, Splicing Techniques and Connectors, standards & classification Optical Fibre.

UNIT II Losses And Dispersion L- 9

Merits and Demerits of Fiber Optics over conventional copper wire systems, Attenuation, Absorption Losses, Scattering Losses, Bending Losses, Core and Cladding Losses, Total combined Losses. Dispersion, Group-Delay, Material Dispersion, Waveguide Dispersion, Intermodal Distortion.

UNIT III Optical Sources And Detectors L- 9

Light-Emitting Diodes (LEDs), LED Structures, Characteristics of LEDs, Laser Diodes, Laser Diode Modes and Threshold Conditions, Laser Diode Structures, Characteristics of Laser Diodes, Comparison between LED and Laser Diode. Physical Principles of

Photodiodes, PIN Photo detector, Avalanche Photodiodes (APD), Photo detector-Noise, Noise-Sources, Signal-to-Noise Ratio, Comparison of Photo detectors. Optical Receiver.

UNIT IV Modulation Techniques And Optical Amplifiers L- 9

Direct modulation and indirect modulation. Injection modulation, A/O, E/O modulation techniques Semiconductor amplifier, rare earth doped fiber amplifier (with special reference to erbium doped fibers), Raman amplifier, Brillouin amplifier – principles of operation, amplifier noise, signal to noise ratio, gain, gain bandwidth, gain and noise dependencies, inter modulation effects, saturation induced crosstalk, wavelength range of operation.

UNIT V OpticalFiber Network And Its Components L-9

TElements of an Optical Fiber Transmission Link, Point-to-Point Links, System Considerations, Link Power Budget, Rise-Time Budget. Single and Multi-Hop Networks, SOA, EDFA, WDM-MUX/DEMUX, Optical-Switches, Couplers, Splitters, Photonic Switching. Potential Applications of Optical Fiber Communication Systems, Applications of Integrated Optics

TOTAL : 45periods

LEARNING RESOURCES:

Text books:

1.Gerd Keiser, "Optical fiber communication", Tata McGraw Hill 3rd Edition

2. John M Senior: `Optical Fiber Communications', PHI 3rd Edition

Reference:

1.*J.Gowar, Optical communication systems, Prentice Hall India, 1987.*

2. G.P.Agrawal: `Nonlinear Fiber Optics', Academic Press.

3. Joseph C Patios, "Fiber Optical Communications", Prentice Hall International

Online Resources :

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. **www.nptel.iitm.ac.in/foc.**
2. **http://www.rp-photonics.com,**
3. **http://nptel.ac.in/syllabus/syllabus.php?subjectId=117101054**

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Course Code: U7ECB26
Course Name: MICROWAVE ENGINEERING
Designed for: Year: IV Semester:VII
Course Educational Objectives :

Students undergoing this course are expected to:

- To inculcate understanding of the basics required for circuit representation of RF networks.
- To deal with the issues in the design of microwave amplifier.
- To instill knowledge on the properties of various microwave components.
- To deal with the microwave generation and microwave measurement techniques

COURSE OUTCOMES

Students undergoing this course are able to

- Understand the multi- port RF networks and RF transistor amplifiers.
- Apply the knowledge of S-parameters to analyze the microwave components
- Understand the knowledge of waveguide to analyze microwave tubes
- Understand the operating principles and performance of microwave semiconductors devices.
- Apply the principle of operation of microwave measurements

Pre-requisites:

- Electromagnetic Field Theory.
- Transmission lines & Wave guides

COURSE CONTENT

UNIT I Introduction To Microwaves **9**

Microwave frequency range, significance of microwave frequency range - applications of microwaves– Review of Low frequency parameters: Impedance, Admittance, Hybrid and ABCD parameters, Different types of interconnection of Two port networks, High Frequency parameters, Formulation of S parameters, Properties of S parameters, Reciprocal and lossless Network, Transmission matrix, RF behavior of Resistors, Capacitors and Inductors.

UNIT II Microwave Devices **9**

Microwave T Junction:H-plane Tee- E-plane Tee ,Hybrid Tee –S Parameter Derivation-Application of Magic Tee- Rat race junction-Directional Coupler-S- Parameter Derivation of Directional Coupler-Wave guides bends,coners,Transtition and twist-Wavegude Termination-Ferrite Devices-Faraday rotation in ferrite-Gyrator-Isolator-Circulator-Microwave Attenuators

UNIT III Microwave Generation **9**

Review of conventional vacuum Triodes, Tetrodes and Pentodes, High frequency effects in vacuum Tubes, Theory and application of Two cavity Klystron Amplifier, Reflex Klystron oscillator, Traveling wave tube amplifier, Magnetron oscillator using Cylindrical, Linear, Coaxial Voltage tunable Magnetrons, Backward wave Crossed field amplifier and oscillator.

UNIT IV Transferred Electron Devices And Avalanche Transit Time Devices **9**

Gunn effect-RWH Theroy-Modes of operations –LSA-Inp-CdTeDiodes-Microwave generation and amplification Read diodes-IMPATT Diode-TRAPATT Diode-BARITT Diode- parametric Devices

UNIT V Microwave Measurements **9**

Slotted line Carriage-VSWR meter-Tunable Detector-Power Measurements-Insertion loss and Attenuation Measuerments-VSWR Measurements-Return Loss-Measurement – Impedance Measurement-Frequency measurements-Dielectric Constant-Measurement of a Solid-Microwave Antenna Measurements.

TOTAL : 45periods

LEARNING RESOURCES

TEXT BOOKS

1. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw Hill Inc., 2004
2. S.Y.Liao, "Microwave Devices and Circuits", Pearson Education Limited, third edition 2006.

REFERENCE BOOKS

1. David M. Pozar, "Microwave Engineering", Wiley India (P) Ltd, New Delhi, 2008.
2. Thomas H Lee, "Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits", Cambridge University Press, 2004.
3. Mathew M Radmanesh, "RF and Microwave Electronics", Prentice Hall, 2000.
4. Kulkarni "Microwave and radar engineering" UMESH Publications, 2003.

ONLINE RESOURCES:

Required Resources: NPTEL

Online Learning:

- http://uotechnology.edu.iq/eretc/books/Microwave%20Devices%20and%20Circuits%20(samuel%20Liao).pdf
- http://swissen.in/trapattdiodes.php

Course Code: UEECB31
Course Name: DIGITAL IMAGE PROCESSING
Designed for: Year: IV Semester:VII

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Course Educational Objectives :

1. Understand digitization, enhancement, restoration, segmentation, feature detection, Object Recognition & Interpretation**.**
2. Ability to apply image processing techniques in both the spatial and frequency (Fourier) domains.
3. Ability to understand image compression model, coding and standards.

COURSE OUTCOMES

Students undergoing this course are able to,

- Analyze and implement the concept of image fundamentals and mathematical transforms necessary for image processing.
- Analyze sampling and quantization processes in obtaining digital images from continuously sensed data.
- Enhance and analyze the images using filtering techniques in the spatial and frequency domain.
- Able to identify the image segmentation and representation techniques.
- Able to identify the most commonly applied color models and their use in basic color image processing, compression and coding standard.

Pre-requisites:

Signals and systems, Digital Signal Processing.

COURSE CONTENT

UNIT I Digital Image Fundamentals L-9

The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing , Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels ,Translation, Scaling, Rotation and Imaging geometry .

UNIT IIEnhancement and Restoration L-9

Enhancement : Arithmetic and Logic operations, Combining Spatial Enhancement Methods , Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Smoothing and Sharpening Frequency Domain Filters , Homomorphic Filtering , histogram modification techniques.

Image restoration: Degradation model, Inverse filter, Wiener filter.

UNIT IIISegmentation & Representation L-9

Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding and its types.

Digital image Representation: Reading, Displaying, Writing Images using MATLAB, Image Types using MATLAB and conversion.

UNIT IV Object Recognition & Interpretation **L-9**

Object Recognition: Patterns and Pattern Classes,Decision-Theoretic Methods, Structural Methods

Interpretation: Knowledge based systems, logical systems, expert systems.

UNIT VImage Compression **L-9**

Image compression models, elements of information theory, transform coding – Video coding, Audio and Video compression standards.

TOTAL: 45 periods

LEARNING RESOURCES

TEXT BOOKS

1. R.C. Gonzalez, & R.E. Woods, 'Digital Image Processing', Addison Wesley, 1998.
2.A.K. Jain, 'Fundamentals of Digital Image Processing', Pearson Education, 1989 / PHI.

REFERENCE BOOKS

1.A. Rosenfield& A.C. Kak, 'Digital Picture Processing', II edition, Academic Press New York 1982.
2.W.K. Pratt, 'Digital Image Processing', II Edition, John Wiley 1991.
3.K.R. Rao, J.J.Hwang, 'Techniques and Standards for Image Video and Audio Coding', Prentice Hall, N.J. 1996.

Online Learning:

www.imageprocessingplace.com
www.mathworks.com
en.wikipedia.org/wiki/Digital image processing
www.mathworks.com/access/helpdesk/help/pdf_doc/matlab/getstart.pdf
www.academia.edu/.../Digital_image_processing_by_Rafael_C._Gonzale..

COURSE CODE: UEECB32
COURSE NAME: MEDICAL ELECTRONICS
DESIGNED FOR: Year: IV Semester: VII
PRE-REQUISTE:
Electronics, Instrumentation, Medical Physics,

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COURSE EDUCATIONAL OBJECTIVES:

1. To learn the concept of human anatomy and physiology and to measure various physiological information and bioelectric potential
2. To familiarize the working of units(transducer and sensor) which will help to restore normal functioning
3. To familiarize the concept of Patient Monitoring Systems and understand the need and technique of electrical safety in Hospitals

COURSE OUTCOME:

On successful completion of this course students will be able to:

1. Understand the basic concept of human anatomy, physiology.
2. Explain the classification, application and specification of medical electronic equipments and electrodes like needle, pad and micro electrodes
3. Explain the concept of various transducers, sensors and bio electrical machines like pressure transducers, flow sensor etc
4. Explain the concept patient monitoring systems and measurements like pulse, BP.
5. Familiarize the types of shocks like macro, micro shock and the concept of safety aspects.

COURSE CONTENT :

UNIT I Anatomy and physiology **Lecture Periods-9**

Elementary ideas of cell structure, Heart and circulatory system., Central nervous system, Muscle action, Respiratory system, Body temperature and reproduction system

UNIT II Overview of Medical Electronics Equipments **Lecture Periods-9**

classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these instruments. Electrodes: Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface, contact impedance, Types of Electrodes, Electrodes used for ECG, EEG, X-Ray & CT Scan

UNIT III Transducers ,Sensors and Bioelectrical Machines **Lecture Periods-9**

Typical signals from physiological parameters, pressure transducer, flow transducer, temperature transducer, pulse sensor, respiration sensor, Bio Medical Recorders Block diagram description and application of following instruments, ECG Machine, EEG Machine, EMG Machine

UNIT IV Patient Monitoring Systems **Lecture Periods-9**

Heart rate measurement, Pulse rate measurement, Respiration rate measurement, Blood pressure measurement, Principle of defibrillator and pace mark, Use of Microprocessor in patent monitoring.

UNIT V Safety Aspects of Medical Instruments **Lecture Periods-9**

Gross current shock, Micro current shock, Special design from safety consideration, Safety standards.

TOTAL : 45 periods

LEARNING RESOURCES

Text Books:

1.Handbook of biomedical Instrumentation by RS Khandpur

Reference Books:

1. Biomedical Instrumentation by Cromwell,
2. Modern Electronics Equipment by RS Khandpur, TMMH, New Delhi
3. Introduction to BioMedical Electronics by Edward J. Perkstein; Howard Bj, USA
4. Biomedical Instrumentation by R.L.Rekha

ONLINE RESOURCES:

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. **http://www.medicalelectronicsdesign.com**
2. **http://electronicsforu.com**
3. www. nptel.in
4. http://nptel.iitm.ac.in/

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COURSE CODE: UEECB33
COURSE NAME: ADVANCED DIGITAL SYSTEM DESIGN

Designed for: Year: IV Semester:VII

PRE-REQUISITE:
DSD

COURSE OBJECTIVES

To impart knowledge on

- Basics on Synchronous & Asynchronous digital switching design.
- Design & realization of error free functional blocks for digital systems

COURSE OUTCOMES

- To expose the students to the fundamentals of digital logic based system design.

COURSE CONTENT

UNIT I **9**

Introduction to VHDL, Review of sequential circuits, Mealy & Moore Models, Analysis & Synthesis of Synchronous sequential circuits, , design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements.

UNIT II **9**

Digital system design Hierachy, ASM charts, Hardware description language, Control logic Design Reduction of state tables, State Assignments, Subprograms – Functions, Procedures, attributes, generics, generate package, IEEE standard logic library, file I/O, test bench, component declaration, configuration , instantiation

UNIT III **9**

Analysis and synthesis of Asynchronous sequential circuits, critical and non-critical races, Essential Hazard, Static and Dynamic Hazards.

UNIT IV **9**

Introduction to CPLD's & FPGA's ,Combinational and sequential circuit design with PLD's, Combinational logic circuit design and VHDL implementation of following circuits – first adder, Subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits

UNIT V **9**

Fault classes and models – Stuck at faults, Bridging faults, Transition and Intermittent faults. Fault Diagnosis of combination circuits by conventional methods- Path sensitization technique, Boolean different method and Kohavi algorithm.

TOTAL : 45 periods

LEARNING RESOUCES

TEXT BOOKS

1. Digital principles and design – By Donald D.Givone
2. Digital circuits and logic design – By Samuel C.Lee, PHI. (For Unit-V only)

REFERENCE BOOKS

1. Logic Design Theory – By N.N.Biswas, PHI.
2.Digital Design – By Morris Mano- 3rd Edition, PHI
3.Switching and Finite Automata Theory – By Kohavi ZVI, 2nd Edition, TMH.

Required Resources:

NPTEL

Recommended Resources:

Online Learning:

www. nptel.in

COURSE CODE: UECSB48
COURSE NAME : SOFT COMPUTING
Designed for: Year: IV Semester:VII

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PRE-REQUISITE:
Fundamentals of computing

LINKS TO OTHER COURSES
NIL-

COURSE EDUCATIONAL OBJECTIVES

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

COURSE OUTCOMES
The students who succeeded in this course;

- Implement numerical methods in soft computing
- Explain the fuzzy set theory
- Apply derivative based and derivative freeoptimization
- Discuss the neural networks and supervised andunsupervised learning networks
- Comprehend neuro fuzzy modelling and Demonstrate some applications of computational intelligence.

COURSE CONTENT

UNIT I Fuzzy Set Theory **L-9**

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II Optimization And Genetic Algorithms **L-9**

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search, Simple GA, crossover and mutation, genetic algorithms in search and optimization

UNIT III Neural Networks **L-9**

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV Neuro Fuzzy Modeling **L-9**

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum, Neuro-fuzzy systems: neuro-fuzzy modeling; neuro-fuzzy control

UNIT V Applications Of Computational Intelligence **L-9**

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction , Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing

TOTAL : 45 periods

BEYOND THE SYLLABUS

Machine Learning Techniques

LEARNING RESOURCES

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2004.

REFERENCE BOOKS

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
2. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 1996.

LEARNING RESOURCES:
Required Resources: NPTEL
Recommended Resources:
Online Learning:www.softcomputing.net.in

COURSE CODE: UEECB35
COURSE NAME: SATELLITE COMMUNICATION

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Designed for: Year: IV Semester:VII

PRE-REQUISITE:

Communication techniques.

LINKS TO OTHER COURSES

NIL

COURSE OBJECTIVES

- To understand the learn the basic concepts and various techniques of satellite communication.

COURSE OUTCOMES

- To understand the various types of satellite communication and services

COURSE CONTENT

UNIT-I **9**

Introduction to Satellite Communication: Types of satellites- Satellite orbit- satellite constellation- orbital mechanics -basic laws- equation of orbit-orbital elements- look angle determination- limits of visibility- eclipse- sub satellite point- sun transit outage- space craft technology structural, primary power, attitude and orbit control, thermal, propulsion, telemetry, tracking and command, communication and antenna subsystems- launching procedures and launch vehicles

UNIT-II **9**

Earth Station and Satellite Link Design: Earth station technology- terrestrial interface, receiver and transmitter, antenna systems-Basic transmission theory- satellite uplink and down link analysis and design for IMMARSAT, INTELSAT etc. Link budget and Eb/No calculation. Performance impairments – system noise, inter modulation and interference. Propagation characteristics and frequency consideration- system reliability and design life Time

UNIT-III **9**

Satellite Access: Types- FDMA concepts- inter modulation and back off- SPADE system- TDMA concept- frame and burst structure- satellite switch TDMA- CDMA concept- DS & FH CDMA system- comparison of multiple access schemes.

UNIT-IV **9**

Laser Satellite Communication: Inter satellite links- optical communication for satellite networks- laser cross link analysis- optical beam acquisition, tracking and pointing.

UNIT-V **9**

Satellite Services: Packet satellite networks and services, fixed satellite services, broadcast satellite services, mobile satellite services- VSAT, global positioning satellite system

maritime satellite services, gateways, ATM over satellite, role of satellite in future network.

TOTAL : 45 periods

TEXT BOOKS

1. Pratt and Bostian, "Satellite communication", John Wiley and Sons, 2007
2. Dennis Roddy, 'Satellite Communication', McGraw Hill International, 4th Edition, 2006.

REFERENCE BOOKS

Tri. T. Ha, "Digital satellite communication system", Mc Graw Hill
2. Pritchend and sciulli, "Satellite communication systems engineering", PHI Learning, 1986
3. Robert M. Gagliendi, "Satellite communication", John Wiley and Sons, 1988
4. M. Richharia, "Satellite communication system design and analysis", Mc-Millan publishers, 1996

Required Resources:

NPTEL

Recommended Resources:

Online Learning:

www. nptel.in

LEARNING AND TEACHING ACTIVITIES:

COURSE CODE: UECSB48
COURSE NAME : SOFT COMPUTING
Designed for: Year: IV Semester:VII

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PRE-REQUISITE:
Fundamentals of computing

LINKS TO OTHER COURSES
NIL-
3.**COURSE EDUCATIONAL OBJECTIVES**

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

COURSE OUTCOMES
The students who succeeded in this course;
- Implement numerical methods in soft computing
- Explain the fuzzy set theory
- Apply derivative based and derivative freeoptimization
- Discuss the neural networks and supervised andunsupervised learning networks
- Comprehend neuro fuzzy modelling and Demonstrate some applications of computational intelligence.

COURSE CONTENT
UNIT I Fuzzy Set Theory **L-9**
Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II Optimization And Genetic Algorithms **L-9**
Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search, Simple GA, crossover and mutation, genetic algorithms in search and optimization

UNIT III Neural Networks **L-9**

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV Neuro Fuzzy Modeling **L-9**

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum, Neuro-fuzzy systems: neuro-fuzzy modeling; neuro-fuzzy control

UNIT V Applications Of Computational Intelligence **L-9**

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction , Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design, Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing

TOTAL : 45 periods

BEYOND THE SYLLABUS

Machine Learning Techniques

LEARNING RESOURCES

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

REFERENCE BOOKS

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

LEARNING RESOURCES:

Required Resources: NPTEL

Recommended Resources:

Online Learning:www.softcomputing.net.in

COURSE NAME: ADVANCED DIGITAL SIGNAL PROCESSING
COURSE CODE: UEECB36
Designed for: Year: IV Semester:VII

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PRE-REQUISITE:
DSP

LINKS TO OTHER COURSES
NIL

COURSE OBJECTIVES

- To study the parametric methods for power spectrum estimation.
- To study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
  To study multirate signal processing fundamentals

COURSE OUTCOMES

- To study the analysis of speech signals.
- To introduce the student to wavelet transforms

COURSE CONTENT

UNIT I PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION 9
Relationship between the auto correlation and the model parameters – The Yule – Walker method for the AR Model Parameters – The Burg Method for the AR Model parameters – unconstrained least-squares method for the AR Model parameters – sequential estimation methods for the AR Model parameters – selection of AR Model order.

UNIT II ADAPTIVE SIGNAL PROCESSING 9
FIR adaptive filters – steepest descent adaptive filter – LMS algorithm – convergence of LMS algorithms – Application: noise cancellation – channel equalization – adaptive recursive filters – recursive least squares.

UNIT III MULTIRATE SIGNAL PROCESSING 9
Decimation by a factor D – Interpolation by a factor I – Filter Design and implementation for sampling rate conversion: Direct form FIR filter structures – Polyphase filter structure.

UNIT IVSPEECH SIGNAL PROCESSING 9
Digital models for speech signal : Mechanism of speech production – model for vocal tract, radiation and excitation – complete model – time domain processing of speech signal:- Pitch period estimation – using autocorrelation function – Linear predictive Coding: Basic Principles – autocorrelation method – Durbin recursive solution.

UNIT V WAVELET TRANSFORMS 9
Fourier Transform : Its power and Limitations – Short Time Fourier Transform – The Gabor Transform - Discrete Time Fourier Transform and filter banks – Continuous Wavelet

Transform – Wavelet Transform Ideal Case – Perfect Reconstruction Filter Banks and wavelets – Recursive multi-resolution decomposition – Haar Wavelet – Daubechies Wavelet.

TOTAL : 45 periods

LEARNING RESOUCES

TEXT BOOKS

1. John G.Proakis, Dimitris G.Manobakis, Digital Signal Processing, Principles, Algorithms and Applications,
Third edition, (2000) PHI.
2. Monson H.Hayes – Statistical Digital Signal Processing and Modeling, Wiley, 2002.

REFERENCE BOOKS

1. L.R.Rabiner and R.W.Schaber, Digital Processing of Speech Signals, Pearson Education (1979).
2. Roberto Crist, Modern Digital Signal Processing, Thomson Brooks/Cole (2004)
3. Raghuveer. M. Rao, Ajit S.Bopardikar, Wavelet Transforms, Introduction to Theory and applications, Pearson Education, Asia, 2000.

Required Resources:

NPTEL

Recommended Resources:

Online Learning:

www. nptel.in

L	T	P	C
3	0	0	3

COURSE CODE: UEECA37
COURSE NAME: OPTO ELECTRONICS

Designed for: Year: IV Semester:VII

PRE-REQUISITE:
Optical communication, Semiconductor devices,

LINKS TO OTHER COURSES
NIL

COURSE OBJECTIVES:

- To know the basics of solid state physics and understand the nature and characteristics of light.
- To analyze the different methods of luminescence, display devices and laser types and their applications.
- To learn the principle of optical detection and coupling mechanism. Understand different light modulation techniques and the concepts and applications of optical switching.
- To learn the integration process and application of optoelectronic integrated circuits in transmitters and receivers.

COURSE OUTCOMES:

On successful completion of this course students will be able to:

- To understand the basics of light propagation, different types of optical emission, detection, modulation and opto electronic integrated circuits and their applications.

COURSE CONTENT:

UNIT I **L -9**

Nature of light Basic optical laws-optical fiber-ray analysis- wave propagation in dielectric slab wave guide-mode theory of optical fibers- multi mode fibers single mode graded index fiber N A- Fiber materials Fabrication- Specifications of a typical optical fiber- reading a data sheets - attenuation Characteristics-dispersion various types and its effects on bandwidth-dispersion shifted fiber polarization maintaining fiber.

UNIT II **L -9**

Optical sources- direct & indirect band gap materials- LED structure-quantum efficiency - modulation. Laser diodes-rate equations-diode structure-single mode laser-modulation and temperature effects-quantum cascade lasers - modal Partition and reflection noise. Photo detectors: PIN, APD, Photo detector noise-response time- structure of detectors receiver units.

UNIT III **L -9**

Light coupling to optical fiber- fiber splices effect of misalignment on signal transmission-fiber-to fiber coupling- optical fiber couplers -Coherent detection comparisons-Transceivers

for fiber optic communication pre amplifier type- optical receiver performance calculation - noise effect on system performance receiver modules.

UNIT IV **L -9**

Components for Fiber optic Networks- Couplers/Splitters- -semiconductor optical amplifier- bandwidth of SOPA- Polarization dependant gain noise-erbium doped fiber amplifiers- W D multiplexes / demultiplexers- Filters- isolator-circulators-Optical switches-wavelength converters- Fiber gratings-tunable sources tunable filters.

UNIT V **L -9**

Optical networks- Basic networks-sonnet/ SDH-wavelength routed networks -Nonlinear effects on network performance-performance of various systems (W DM DW DM + SOA) - Optical CDM A-Ultra high capacity networks

TOTAL: 45 periods

BEYOND THE SYLLABUS

1. Raman amplifier.
2. Fiber Manufacturing.
3. ODTR

LEARNING RESOURCES:

TEXT BOOKS

1. Optical Fiber Communication: Gred Keiser M c Graw Hill Third edition

REFERENCE BOOKS

1. Optical communication components & Systems : J H Franz Narosa Publication
2. Fiber Optic Technology D K Mynbaev & LL Scheiner Pearson Education Asia
3. Optical Fiber Communication and applications S C Gupta PHI

Required Resources:

1. Optical Fiber Communication: Gred Keiser M c Graw Hill Third edition

Recommended Resources:

1.Optical communication components & Systems : J H Franz Narosa Publication
2.Fiber Optic Technology D K M ynbaev & LL Scheiner Pearson Education Asia
3. Optical Fiber Communication and applications S C Gupta PHI
4. Optical Fiber Communication by John M.Senior

Online Learning:

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

1. **www.rp-photonics.com,**
2.http://electronicsforu.com
3. Google Web Source

COURSE CODE: UEECB40
COURSE NAME: REAL TIME SYSTEM

L	T	P	C
3	0	0	3

PRE-REQUISITE:

Fundamentals of computing

COURSE OBJECTIVES

- Know about the specification and design techniques of a Real Time System.
- Understand about real time task communication and synchronization
- Have a vast knowledge of queuing models and Real Time System integration

.

COURSE OUTCOMES

On successful completion of this course students will be able to:

1. Understand the basics and importance of real-time systems
2. Generate a high-level analysis document based on requirements specifications
3. Generate a validation plan based on all documentation
4. Understand basic multi-task scheduling algorithms for periodic, aperiodic, and sporadic tasks as well as understand the impact of the latter two on scheduling
5. Understand capabilities of at least one commercial off-the-shelf R-T kernel

Participate in a team design project, utilizing varying skill sets of members.

COURSE CONTENT

UNIT I INTRODUCTION 9

Introduction - Issues in Real Time Computing, Structure of a Real Time System. Task Classes, Performance Measures for Real Time Systems, Estimating Program Run times. Task Assignment and Scheduling - Classical Uniprocessor scheduling algorithms,UniProcessor scheduling of IRIS Tasks, Task Assignment, Mode Changes, and Fault Tolerant Scheduling.

UNIT II PROGRAMMING LANGUAGES AND TOOLS 9

Programming Language and Tools – Desired Language characteristics, Data Typing, Control structures, Facilitating Hierarchical Decomposition, Packages, Run-time (Exception) Error handling, Overloading and Generics, Multitasking, Low Level programming, Task scheduling, Timing Specifications, Programming Environments, Run-time Support.

UNIT III REAL TIME DATABASES 9

Real time Databases - Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time systems.

UNIT IV COMMUNICATION 9

Real-Time Communication - Communications Media, Network Topologies Protocols, Fault Tolerant Routing. Fault Tolerance Techniques - Fault Types, Fault Detection. Fault Error containment Redundancy, Data Diversity, Reversal Checks, Integrated Failure handling.

UNIT V EVALUATION TECHNIQUES 9

Reliability Evaluation Techniques - Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models. Clock Synchronization - Clock, A Nonfault-

Tolerant Synchronization Algorithm, Impact of Faults, Fault Tolerant Synchronization in Hardware, Fault Tolerant Synchronization in Software

TOTAL : 45 periods

LEARNING RESOUCES

TEXT BOOKS

1 C.M. Krishna, Kang G. Shin, “Real-Time Systems”, McGraw-Hill International Editions, 1997.

REFERENCE BOOKS

1. Stuart Bennett, “Real Time Computer Control-An Introduction”,Second edition Perntice Hall PTR, 1994.
2. Peter D. Lawrence, “Real time Micro Computer System Design – An Introduction”, McGraw Hill, 1988.
3. S.T. Allworth and R.N. Zobel, “Introduction to real time software design”, Macmillan,II Edition, 1987.
4. R.J.A Buhur, D.L. Bailey, “ An Introduction to Real-Time Systems”, Prentice-Hall International, 1999.
5. Philip.A.Laplante “Real Time System Design and Analysis” PHI , III Edition, April 2004.

COURSE NAME: UEECB41
COURSE CODE: APPLICATION SPECIFIC INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

PRE-REQUISITE:
VLSI Design

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COURSE OBJECTIVES

- Learn the basic CMOS circuits.
- Learn the CMOS process technology.
- Learn techniques of chip design using programmable devices.
- Learn the concepts of modeling a digital system using Hardware Description Language.

COURSE OUTCOMES

On successful completion of this course students will be able to:

1. Introduce the technology, design concepts and testing of Application Specific Integrated Circuits
2. Learn to describe and model digital circuits using a hardware description language.
3. Must conduct simple experiments to determine if a design is working properly, applying patterns and examining the output.
4. Design project which covers the final third of the course is open-ended and requires justification that the student's solution is the best

COURSE CONTENT

UNIT I Introduction To ASICs, CMOS Logic And ASIC Library Design L-9

Types of ASICs - Design flow - CMOS transistors CMOS Design rules - Combinational Logic Cell – Sequential logic cell - Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort –Library cell design - Library architecture .

UNIT II Programmable ASICs, Programmable ASIC Logic Cells And Programmable ASIC I/O Cells L-9

Anti fuse - static RAM - EPROM and EEPROM technology - PREP benchmarks - Actel ACT - Xilinx LCA –Altera FLEX - Altera MAX DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.

UNIT III Programmable Asic Interconnect, Programmable ASIC Design Software And Low Level Design Entry L-9

Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 - Altera FLEX –Design systems - Logic Synthesis - Half gate ASIC -Schematic entry - Low level design language - PLA tools -EDIF- CFI design representation.

UNIT IV Logic Synthesis, Simulation And Testing L-9

Verilog and logic synthesis -VHDL and logic synthesis - types of simulation -boundary scan test - fault simulation - automatic test pattern generation.

UNIT V ASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT AND ROUTING ***L-9***

System partition - FPGA partitioning - partitioning methods - floor planning - placement - physical design flow –global routing - detailed routing - special routing - circuit extraction - DRC.

TOTAL : 45 periods

BEYOND THE SYLLABUS

- **Cool runner**
- **Xilinx vertex**

LEARNING RESOURCES
TEXT BOOKS

1.M.J.S .Smith, "Application Specific Integrated Circuits, Addison -Wesley Longman Inc., 1997

REFERENCE BOOKS

1.Farzad Nekoogar and Faranak Nekoogar, From ASICs to SOCs: A Practical Approach, Prentice
Hall PTR, 2003.
2Wayne Wolf, FPGA-Based System Design, Prentice Hall PTR, 2004.
3.R. Rajsuman, System-on-a-Chip Design and Test. Santa Clara, CA: Artech House Publishers, 2000.
4.F. Nekoogar. Timing Verification of Application-Specific Integrated Circuits (ASICs).
Prentice Hall PTR, 1999

Required Resources:
NPTEL
Recommended Resources:
Online Learning:
www. nptel.in

LEARNING AND TEACHING ACTIVITIES:

Learning and Teaching Modes:

This course relies on lectures to guide through the material, tutorial classes to provide students with class, and a sequence of written and online assignments to provide formative assessment opportunities for students to practice techniques and develop their understanding of the course.

COURSE CODE: UEECB43
COURSE NAME: COMMUNICATION PROTOCOL ENGINEERING
Designed for: Year: IV Semester:VII

L	T	P	C
3	0	0	3

PRE-REQUISITE:
Communication system Techniques

LINKS TO OTHER COURSES
NIL

Course Educational Objectives:
- To provide basic knowledge about network model standards.
- To analyze the Protocol Specifications
- To check the protocol Validation.

Course Outcomes:
After completion of this course students will be able to
1. Learn thoroughly about Network model, Protocol and its development for basic reference models.
2. Implement Various protocol specification for their validation and verification.

Course Content

UNIT INetwork Reference Model **Lecture Periods -9**

Communication model-software, subsystems, protocol, protocol development methods, Protocol engineering process, Layered architecture, Network services and Interfaces, Protocol functions, OSI model ,TCP/IP protocol suite

UNIT II Protocol Specifications **Lecture Periods -9**

Components of protocol, Specifications of Communication service, Protocol entity, Interface, Interactions, Multimedia protocol, Internet protocol, SDL, SDL based protocol- other protocol specification languages.

UNIT III Protocol Verification/Validation **Lecture Periods -9**

Protocol verification, Verification of a protocol using finite state machines, Protocol validation, protocol design errors, Protocol validation approaches, SDL based protocol verification and validation

UNIT IV Protocol Conformance/Performance Testing **Lecture Periods -9**

Conformance testing methodology and frame work, Conformance test architectures, Test sequence generation methods, Distributed architecture by local methods, Conformance testing with TTCN, systems with semi controllable interfaces - RIP,SDL based tools for conformance testing, SDL based conformance testing of MPLS Performance testing, SDL based performance testing of TCP and OSPF, Interoperability testing, SDL based

interoperability testing of CSMA/CD and CSMA/CA protocol using Bridge, Scalability testing

UNIT V Protocol Synthesis And Implementation **Lecture Periods -9**

Protocol synthesis, Interactive synthesis algorithm, Automatic synthesis algorithm, Automatic synthesis of SDL from MSC, Protocol Re-synthesis; Requirements of protocol implementation, Object based approach to protocol implementation, Protocol compilers, Tool for protocol engineering

TOTAL : 45 periods

LEARNING RESOURCES

TEXT BOOKS

1 Pallapa Venkataram and Sunilkumar S.Manvi, "Communication protocol Engineering", Eastern Economy edition, 2004

REFERENCE BOOKS

1 Richard Lai and Jirachiefpattana, "Communication Protocol Specification and Verification", Kluwer Publishers, Boston, 1998.
2 Tarnay, K., "Protocol Specification and Testing", Plenum, New York, 1991.
3 Mohamed G. Gouda, "Elements of Network Protocol Design", John Wiley & Sons, Inc. New York, USA, 1998
4 V.Ahuja, "Design and Analysis of Computer Communication networks", McGraw-Hill, London, 1982.
5 G.J.Holtzmann, "Design and validation of Computer protocols", Prentice Hall, New York, 1991.

LEARNING AND TEACHING ACTIVITIES:

COURSE CODE: UECSB78
COURSE NAME:NETWORK SECURITY
Designed for: Year: IV Semester:VII

L	T	P	C
3	0	0	3

PRE-REQUISITE:

Fundamentals of computing

LINKS TO OTHER COURSES

NIL

COURSE OBJECTIVES

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Network Security

.

COURSE OUTCOMES

- To know the various standards and aspects of network security

COURSE CONTENT

UNIT I INTRODUCTION **9**

OSI Security Architecture – Attacks-Services & Mechanisms –Security Attacks – Security Services –A Model for Internetwork Security – Internet standards and RFC's – Key principles of Network Security-RSA,DES

UNIT II INFORMATION SYSTEM SECURITY MANAGEMENT **9**

Security Policies – Security Life cycle management – Security operation Management – Security awareness – Access control – Authentication and Authorization controls – Data security Architecture – Security Management Architecture.

UNIT III FIREWALL AND SYSTEM SECURITY **9**

Intruders-worms – Intrusion Detection – Firewalls – Firewall Design Principles – Trusted Systems – Virus Related Threats – Virus Counter measures – VPN Security– Wireless Network Security

UNIT IV NETWORK SECURITY **9**

Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME – IP Security – Web Security.

UNIT V NETWORK MANAGEMENT SECURITY **9**

Basic concepts of SNMP – SNMPV1 – SNMPV1 Community facility – SNMPV3 – RMON

TOTAL : 45 periods

LEARNING RESOUCES

TEXT BOOKS

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Prentice Hall of India, Third Edition, 2003.
2. Roberta Bragg, Mark Rhodes-Ousley, Keith Strassberg, "Network Security: The Complete reference", Tata McGraw-Hill Edition 2004.
3. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Third Edition, Addison Wesley, 1999.

REFERENCE BOOKS

1. Cole, Krutz and Conley "Network Security Bible" Copyright 2005 by Wiley Dreamtech India (P) Ltd.
2. Bragg, Rhodes-Ousley-Stassberg,et..al, TATA McGRAW-HILL Edition.
3. Mani Subramanian "Network Management - Principles and practice ".Pearson Edition.

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Required Resources:

NPTEL

Recommended Resources:

Online Learning:

www. nptel.in

COURSE CODE: UEECB39
Course Name: TELECOMMUNICATION SWITCHING TECHNIQUES
Designed for: Year: IV Semester: VII

L	T	P	C
3	0	0	3

COURSE EDUCATIONAL OBJECTIVES:

- To introduce digital multiplexing and digital hierarchy namely SONET / SDH.
- To introduce the need for network synchronization and study synchronization issues and provide an outline for network control and management issues.

COURSE OUTCOMES:

On successful completion of this course students will be able to:

- Understand how telecommunication switching Processing takes place and where it is applicable in real time in their daily activities.
- To know what are the configuration used in hardware and software integration
- They will know how traffic has been occurred due to number of switching user
- Able to know various types techniques i.e.(PCM/TDM, Digital multiplexing, synchronous, asynchronous) used in digital network
- Able to know the different multiple access techniques used in data networks.

PRE-REQUISITES:

- Computer Networks

LINK TO OTHER COURSES

- Wireless Communication Networks

COURSE CONTENT:

UNIT I Evolution Of Telecommunication Switching And Circuit 9

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

UNIT II Electronic Switching 9

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

UNIT III Telecommunication Signalling And Traffic 9

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

UNIT IV Integrated Digital Networks 9

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

UNIT V Data Networks 9

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

TOTAL: 45 periods

LEARNING RESOURCES

Text Books:

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

Reference Books:

1. Behrouz Forouzan, Introduction to Data Communication and Networking, McGraw-Hill, 1998.
2. Lawton L.S, Integrated Digital Networks, Galgotta Publication Pvt., Ltd., New Delhi, 199

Online Resources:

1. http://en.wikipedia.org/wiki/telecommunications
2. http://www.see.ed.ac.uk/~hxh/ADCCourseMaterial/4.rc.2.pdf
3. http://www.diva-portal.org/smash/get/diva2:501119/FULLTEXT01.pdf
4. http://www.durofy.com/multiple-access-techniques-fdma-tdma-cdma/
5. www. nptel.in

COURSE CODE U7ECB27
COURSE NAME : OPTICAL & MICROWAVE LAB
DESIGNED FOR YEAR/SEM : IV/VII

L	T	P	C
0	0	3	2

COURSE EDUCATIONAL OBJECTIVES:

1. To study passive microwave components and their S-Parameters.
2. To study Microwave semiconductor devices & applications.
3. To study Microwave sources and amplifiers.

COURSE OUTCOME:

6. Understand the basic operating principles of single mode, multimode fibers, light sources, detectors, amplifiers and passive optical devices.
7. Design a simple optical communication link.
8. Interpret the optical losses characteristic in optical fiber such as dispersion, scattering,absorption, nonlinear effects, fiber alignment and splicing that affect the performance of transmission systems.
9. Understand the practical usuage of active & passive microwave devices & components used in Microwave communication systems**.**
10. Describe, analyze and design simple microwave circuits and devices e g matching circuits, couplers, antennas and amplifier.

PRE-REQUISITE:

Transmission Lines & Waveguides

LINK TO OTHER COURSES:

Base for microwave communication systems.

COURSE CONTENT :

LIST OF EXPERIMENTS

CYCLE-I

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers.
2. Mode Characteristics of Fibres – SM Fibres.
3. Coupling Fibers to Semi-Conductor Sources – Connectors & Splices.
4. Fiber optic communication links. – Analog & Digital
5. LED & Photo Diode Characteristics.
6. Measurement of Bending loss & coupling loss in Optical fiber.

CYCLE-II

7. VSWR Measurements – Determination of terminated impedance
8. Determination of guide wavelength, frequency measurement.
9. Radiation Pattern of Horns, Paraboloids.
10. Microwave Power Measurement.
11. Characteristics of Gunn diode Oscillator.

LEARNING RESOURCES:

Text Books:

1. Annapurna Das and Sisir K Das, “Microwave Engineering”, Tata Mc Graw Hill Inc., 2004
2. S.Y.Liao, “Microwave Devices and Circuits”, Pearson Education Limited, third

edition 2006.

Reference Books :

1. David M. Pozar, “Microwave Engineering”, Wiley India (P) Ltd, New Delhi, 2008.
2. Thomas H Lee, “Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits”, Cambridge University Press, 2004.
3. Mathew M Radmanesh, “RF and Microwave Electronics”, Prentice Hall, 2000.
4.Kulkarni “Microwave and radar engineering” UMESH Publications, 2003

Online Resources :

This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this recourse.

a. 1.http://uotechnology.edu.iq/eretc/books/Microwave%20Devices%20and%20Circuits%20(samuel%20Liao).pdf
b. 2.http://swissen.in/trapattdiodes.php

COURSE CODE : U7ECB28
COURSE NAME : VLSI DESIGN LAB
DESIGNED FOR YEAR/SEM : IV/VII

L	T	P	C
0	0	3	2

COURSE EDUCATIONAL OBJECTIVES:

a. To learn the basic CMOS circuits.
b. To learn the CMOS process technology.
c. To learn techniques of chip design using programmable devices.

COURSE OUTCOME:

1. Able to write the verilog HDL coding..
2. Design and simulate the combinational circuits using verilog HDL.
3. Design and simulate the sequential circuits using verilog HDL.
4. Design and implement combinational circuits on FPGA kit.
5. Ability to implement the real time applications.

PRE-REQUISITE: Digital System Design

LINK TO OTHER COURSES: Electronic simulation lab

Course Content :

List Of Experiments

CYCLE-I

1. Study of synthesis tools using verilog with help of
   a. Combinational circuit's b. Sequential circuits
2. Study of simulation tools using verilog with help of
   a. Combinational circuit's b. Sequential circuits
3. Study of fpga board and testing on board leds and switches using verilog codes with help of Combinational circuit's b. Sequential circuits
4. Study and development tool for FPGA using verilog coding with help of
   b. Combinational circuit's b. Sequential circuits
5. Design and simulation of back annotated verilog files for multiplying two signed, 8 bit numbers in 2's compliment. Design must be pipelined and completely rtl compliant

CYCLE-II

1. Design and simulation of pipelined serial adder to add/subtract 8 number of size, 12 bits each in 2's compliment
2. Design and simulation of pipelined parallel adder to add/subtract 8 number of size, 12 bits each in 2's compliment
3. Design of traffic light controller using verilog
4. Testing the traffic controller design using FPGA board
5. Design a real time clock and demonstrate its working on the FPGA board.

LEARNING RESOURCES:

Text Book : Verilog HDL Samir palnitkar
Reference Books : VHDL by samir palnitkar
Online Resources : http://www.edaboard.com/group128-