SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:PUTTUR
(AUTONOMOUS)
Department of Electronics & Communication Engineering

I B. Tech. – I Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P/Drg	C
1.	18HS0830	Mathematics-I	3	-	-	3
2.	18HS0801	Chemistry	3	1	-	4
3.	18ME0302	Engineering Graphics & Design	1	-	4	3
4.	18HS0810	English	3	-	-	3
5.	18HS0802	Chemistry lab	-	-	3	1.5
6.	18HS0811	English Lab	-	-	3	1.5
7.	18ME0301	Workshop Practice Lab	-	-	4	2
		Induction Program (3 Weeks)	-	-	-	-
Contact Periods / Week			10	1	14	18
			Total/Week 25			

I B. Tech. – II Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P	C
1.	18HS0831	Mathematics-II	3	1	-	4
2.	18HS0851	Semiconductor Physics	3	1	-	4
3.	18EE0239	Basic Electrical Engineering	3	-	-	3
4.	18CS0501	Programming For Problem Solving	3	-	-	3
5.	18CE0101	Engineering Mechanics	2	1	-	3
6.	18HS0852	Physics Lab	-	-	3	1.5
7.	18CS0503	Programming For Problem Solving Lab	-	-	3	1.5
Non -Credit Course						
8.	18HS0817	Essence of Indian Traditional Knowledge	3	-	-	-
Contact Periods / Week			17	3	6	20
			Total/Week 26			

II B. Tech. – I Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P	C
1.	18HS0834	Mathematics-III	3	1	-	4
2.	18EC0401	Electronic Devices	3	-	-	3
3.	18EC0402	Digital System Design	3	-	-	3
4.	18EC0403	Signals & Systems	3	-	-	3
5.	18EE0242	Network Theory	3	-	-	3
6.	18EC0404	Electronic Devices Lab	-	-	3	1.5
7.	18EC0405	Digital System Design Lab	-	-	2	1
8.	18EC0406	Signals and Systems Simulation Lab	-	-	3	1.5
Non -Credit Course						
9.	18HS0816	Indian Constitution	3	-	-	-
Contact Periods / Week			18	1	8	20
			Total/Week 27			

II B. Tech. – II Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P	C
1.	18EC0407	Analog Circuits	3	-	-	3
2.	18EC0408	Analog Communications	3	-	-	3
3.	18EC0409	Probability Theory and Stochastic Processes	3	1	-	4
4.	18HS0812	Managerial Economics and Financial Analysis	3	-	-	3
5.	18HS0803	Biology for Engineers	3	-	-	3
6.	18EC0410	Analog Circuits Lab	-	-	3	1.5
7.	18EC0411	Analog Communications Lab	-	-	3	1.5
Credit Course						
8.	COE-I	Comprehensive Online Exam -I	-	-	-	1
Non -Credit Course						
9.	18HS0804	Environmental Sciences	3	-	-	-
Contact Periods / Week			18	1	6	20
			Total/Week 25			

III B.Tech– I Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P	C
1.	18EE0211	Control Systems	3	-	-	3
2.	18EC0412	Electromagnetic Theory and Transmission Lines	3	-	-	3
3.	18EC0413	Electronic Measurements and Instrumentation	3	-	-	3
4.	18EC0414	Digital Signal Processing	3	-	-	3
5.	18EC0415	Digital Communications	3	-	-	3
6.	18EC0416	Electronic Measurements Lab	-	-	3	1.5
7.	18EC0417	Digital Signal Processing Lab	-	-	4	2
8.	18EC0418	Digital Communications Lab	-	-	3	1.5
Non -Credit Course						
9.	18HS0859	English for Corporate Communication Skills Lab	-	-	2	-
Contact Periods / Week			15	-	12	20
			Total/Week 27			

III B. Tech – II Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P	C
1.	18EC0451	Data Communication and Networking	3	-	-	3
2.	18EC0419	Antennas and Wave Propagation	3	-	-	3
3.	18EC0420	Microprocessors and Microcontrollers	3	-	-	3
	Professional Elective Course (PEC) –I					
4.	18EC0428	Microwave Theory and Techniques	3	-	-	3
	18EC0429	Information Theory and Coding				
	18EC0430	Scientific Computing				
	Open Elective-I					
5.	18CE0127	Elements of Road Traffic Safety	3	-	-	3
	18EE0234	Industrial Instrumentation				
	18ME0307	Non-Conventional Energy Resources				
	18CS0517	Python Programming				
	18HS0814	Intellectual Property Rights				
6.	18EC0421	Antennas and Wave Propagation Lab (Virtual Lab)	-	-	2	1
7.	18EC0422	Microcontroller and Applications Lab	-	-	2	1
8.	18EC0425	Internship (60 Hours)	-	-	-	2
	Credit Course					
9.	COE-II	Comprehensive Online Examination -II	-	-	-	1
	Non -Credit Course					
10.	18HS0842	Aptitude Practices	3	-	-	-
Contact Periods / Week			18	-	4	20
			Total/Week 22			

IV B.Tech – I Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P	C
1.	18HS0813	Management Science	3	-	-	3
2.	18EC0440	Embedded Systems and IoT	3	-	-	3
3.	**Professional Elective Course (PEC) –II**					
	18EC0431	VLSI Design	3	-	-	3
	18EC0432	Wavelets				
	18EC0433	Satellite Communication				
4.	**Professional Elective Course (PEC) –III**					
	18EC0434	Digital Image Processing	3	-	-	3
	18EC0435	Speech and Audio Processing				
	18EC0436	Hi Speed Electronics				
5.	**Professional Elective Course (PEC) –IV**					
	18EC0437	Mobile Communications and Networks	3	-	-	3
	18EC0438	Fiber Optic Communications				
	18EC0439	Bio-Medical Electronics				
6.	**Open Elective-II**					
	18CE0146	Project Planning and Control	3	-	-	3
	18EE0236	Solar Photovoltaic Systems				
	18ME0353	Computer Aided Process Planning				
	18CS0544	Software Development & Testing				
	18HS0815	Entrepreneurship Development				
7.	18EC0423	Embedded Systems and IoT Lab	-	-	3	1.5
8.	18EC0424	Microwave Measurements Lab	-	-	3	1.5
9.	18EC0426	Project Phase-I	-	-	4	2
Contact Periods / Week			15	-	10	23
			Total/Week : 25			

IV B.Tech – II Semester (E.C.E)

S.No.	Course Code	Subject	L	T	P	C
1.	**MOOC – I**		3	-	-	3
2.	**MOOC – II**		3	-	-	3
3.	18EC0427	Project Phase -II	-	-	22	11
4.	18EC0441	Comprehensive Viva Voce	-	-	-	2
Contact Periods / Week			6	-	22	19
			Total/Week:28			

NOTE: L-Lecture, T- Theory, P-Practical, Drg. – Drawing , C-Credit

Year	I Year		II Year		III Year		IV Year		Total
Semester	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	
Credits	18	20	20	20	20	20	23	19	160

Total Credits: 160

LIST OF SUBJECTS

S.No.	Course Code	Subject
Program Core Courses		
1.	18EC0401	Electronic Devices
2.	18EC0402	Digital System Design
3.	18EC0403	Signals & Systems
4.	18EC0404	Electronic Devices Lab
5.	18EC0405	Digital System Design Lab
6.	18EC0406	Signals and Systems Simulation Lab
7.	18EC0407	Analog Circuits
8.	18EC0408	Analog Communications
9.	18EC0409	Probability Theory and Stochastic Processes
10.	18EC0410	Analog Circuits Lab
11.	18EC0411	Analog Communications Lab
12.	18EC0412	Electromagnetic Theory and Transmission Lines
13.	18EC0413	Electronic Measurements and Instrumentation
14.	18EC0414	Digital Signal Processing
15.	18EC0415	Digital Communications
16.	18EC0416	Electronics Measurements Lab
17.	18EC0417	Digital Signal Processing Lab
18.	18EC0418	Digital Communications Lab
19.	18EC0451	Data Communication and Networking
20.	18EC0419	Antennas and Wave Propagation
21.	18EC0420	Microprocessors and Microcontrollers
22.	18EC0421	Antennas and Wave Propagation Lab (Virtual Lab)
23.	18EC0422	Microcontroller and Applications Lab
24.	18EC0440	Embedded Systems & IoT
25.	18EC0423	Embedded Systems & IoT Lab
26.	18EC0424	Microwave Measurements Lab
27.	18EC0425	Internship (60 Hours)
28.	18EC0426	Project Phase-I
29.	18EC0427	Project Phase-II
30.	18EC0441	Comprehensive Viva Voce
Professional Elective Courses		
31.	18EC0428	Microwave Theory and Techniques
32.	18EC0429	Information Theory and Coding
33.	18EC0430	Scientific Computing
34.	18EC0431	VLSI Design
35.	18EC0432	Wavelets
36.	18EC0433	Satellite Communication
37.	18EC0434	Digital Image Processing
38.	18EC0435	Speech and Audio Processing
39.	18EC0436	Hi Speed Electronics
40.	18EC0437	Mobile Communications and Networks
41.	18EC0438	Fiber Optic Communications
42.	18EC0439	Bio-Medical Electronics

Subjects Offered To Other Branches		
43.	18EC0443	Analog Electronic Circuits
44.	18EC0444	Digital Electronics
45.	18EC0445	Analog Electronic Circuits Lab
46.	18EC0420	Microprocessors and Microcontrollers
47.	18EC0422	Microcontroller and Applications Lab
48.	18EC0414	Digital Signal Processing
Open Elective Courses		
49.	18EC0449	Introduction to IOT
50.	18EC0450	MATLAB Programming

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(18HS0830) MATHEMATICS-I

(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.
2. To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.
4. To familiarize the student with functions of several variables that is essential in most branches of engineering.
5. To develop the essential tool of matrices and linear algebra in a comprehensive manner.

COURSE OUTCOMES (COs)

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

1. Familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra.
2. Equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

UNIT – I

Matrices: Inverse and rank of a matrix; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigen vectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

UNIT – II

Calculus: Evaluation of definite and improper integrals; Applications of definite integrals to evaluate surface areas and volumes of revolutions; Beta and Gamma functions and their properties. Rolle's Theorem, Mean value theorems (without proof) Taylor's and Maclaurin's theorems.

UNIT – III

Multivariable Calculus (Differentiation): Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, curl and divergence.

UNIT – IV

Sequences and Series: Convergence of sequence and series, tests for convergence (Geometric test, P- test, limit comparison test, D' Alember ratio test, Cauchy' s nth root test), Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

UNIT-V

Fourier series: Determination of Fourier coefficients- Fourier series- Even and odd functions, Fourier Series in an arbitrary interval, Periodic function, Half range sine and cosine series.

TEXT BOOKS

1. *Higher Engineering Mathematics*, B.S.Grewal, Khanna publishers-42nd Edition(2012)
2. *Engineering Mathematics Volume-I*, by T.K.V. Iyengar, S.Chand publication-12th Edition
3. *A Text book of B.Sc. mathematics* volume-II, V.Venkateswara Rao S.Chand Publications

REFERENCES

1. *Higher Engineering Mathematics* Ramana B.V., Tata McGraw Hill New Delhi, 11th Reprint, 2010.
2. *Engineering Mathematics*, volume-I&II, E.Rukmangadachari & E.Keshava Reddy Pearson Publishers.
3. *Linear Algebra A Modern Introduction* D. Poole,:, 2nd Edition, Brooks/Cole, 2005.
4. *A text book of Engineering Mathematics* N.P. Bali and Manish Goyal, , Laxmi Publications, Reprint, 2008.
5. *Linear Algebra & Vector Calculus* Bhavanari Satyanarayana, T.V.Pradeep kumar & D.Srinivasulu "", Studera Press, New Delhi.

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L	T	C
3	1	4

(18HS0801) CHEMISTRY

(Common to all Branches)

COURSE OBJECTIVES

The objectives of this course:

1. Aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools.
2. Technology is being increasingly based on the electronic, atomic and molecular level modifications.
3. Quantum theory is more than 100 years old and to understand phenomena at Nanometer levels, one has to base the description of all chemical processes at molecular levels.

COURSE OUTCOMES (COs)

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

1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Able to design the flowchart and algorithm for real world problems
3. Able to learn and understand new programming languages
4. Able to construct modular and readable programs Rationalise bulk properties and processes using thermodynamic considerations.
5. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

UNIT- I

ATOMIC, MOLECULAR STRUCTURE AND PERIODIC PROPERTIES: Schrodinger wave equation, Molecular orbital's of diatomic molecules. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Effective Nuclear charge, variations of s, p, d and f orbital energies of atoms in the periodic table, atomic and ionic sizes, oxidation states, hard soft acids and bases, molecular geometries.

UNIT- II

USES OF FREE ENERGY AND CHEMICAL EQUILIBRIA: Thermodynamic functions: Energy Entropy and free energy, Cell potentials, Nernest equations and Its Applications. Acid base Oxidation, reduction and Solubility Equilibria.

CORROSION: Types of Corrosion, Factors Influencing the rate of Corrosion, Prevention of Corrosion (Sacrificial anodic protection, Impressed Cathodic Protection), Anodic and Cathodic Inhibitors, Electro plating (Copper, Nickel, Chromium) and Electroless Plating.

UNIT-III

WATER TECHNOLOGY: Hardness of water and its units, Estimation of Hardness by EDTA method. Boiler Troubles: Scale & Sludge, Priming and Foaming and Boiler corrosion. Municipal Solid waste water Treatment. Break point chlorination, Water softening methods (Lime-Soda, Zeolite, Ion- Exchange resins). Demineralization of Brackish Water: Reverse Osmosis and Electro Dialysis.

UNIT-IV

ORGANIC REACTIONS AND ORGANIC POLYMERS: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, Synthesis of a commonly used drug molecules (Paracetamol, Penicillin, Prodrugs - Asprin, Sulfa drugs).

Organic polymers types (Thermosetting and Thermoplastics), Preparation, Properties and Engineering Applications of PVC, Teflon, Nylon6,6, Bakelite), Moulding Process and its uses, Conducting polymers (polyacetylene, Polyaniline).

UNIT-V

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS: Principles, selection rules and applications of absorption (UV/Visible, Atomic Absorption, Infrared) and Emission spectroscopy (Flame photometry and Fluorescence and its applications in medicine. Advanced Instrumental Techniques and their Significance: XRD, Scanning Electron microscope (SEM) and Transmission electron microscopy (TEM).

TEXT BOOKS

1. *University chemistry*, by B. H. Mahan
2. *Chemistry: Principles and Applications*, by M. J. Sienko and R. A. Plane
3. *Fundamentals of Molecular Spectroscopy*, by C. N. Banwell
4. *Engineering Chemistry (NPTEL Web-book)*, by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. *Physical Chemistry*, by P. W. Atkins
6. *Organic Chemistry*: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

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	1	4	3

(18ME0302) ENGINEERING GRAPHICS & DESIGN

COURSE OBJECTIVES

The Objective of this course:

1. To familiarize the students in basic concept of conic sections, projections and Development of Objects.
2. To develop the imagination and drafting skills of students.

COURSE OUTCOMES (COs)

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

1. Frame ideas based on the conceptual modeling and design
2. Provide good understanding of the methods involved in preparing various views in Engineering drawings.
3. Can prepare 2D and 3D diagrams of various objects.

UNIT-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections, Cycloids and Involutes.

UNIT-II

Projections of Points: Principles of Orthographic Projections-Conventions - Projections of Points, Traces

Projections of straight lines: Inclined to both the planes - simple problems only, Traces.

UNIT-III

Projections of Planes: Planes (Inclined to single plane only).

Projections of Solids: Introduction– Projections of right regular solids-Prisms, Pyramids in different positions (Single plane only).

UNIT-IV

Sections of solids: Sectional Views of Right regular Solids - Prisms, Pyramids.

Development of surfaces: Development of surfaces of Right Regular Solids - Prisms, Pyramids.

UNIT-V

Orthographic Projections: Principles of Orthographic projection, Conversion of objects from 3D to 2D

Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D.

Auto CAD (for Practice only not for External Exam)

Introduction to CAD, Applications, commands, Tool bar, modeling of Simple parts, isometric problems.

TEXT BOOKS

1. *Engineering Drawing*, N.D.Bhatt, Charotar Publishers
2. *A text Book of Engineering Drawing*, K.L.Narayana, Kannaiah, Scitech Publishers, 2010
3. *Engineering Graphics with using AutoCAD,2007*. Jeyapoovan.T, Vikas Publishing House

REFERENCES

1. *Fundamentals of Engineering Drawing*, Warren J.Luzadder and Jon. M.Duff Prentice Hall of India Pvt., Ltd., Eleventh Edition, 2001.
2. *Engineering Graphics,* Bhattacharyya, S.C.Bera, I.K .International Pvt Ltd. 2009.
3. *A text Book of Engineering Drawing and Graphic,* K.Venugopal New Age Publishin New Delhi, 2008.

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3	-	3

(18HS0810) ENGLISH

(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. To develop interest in reading English Literature for language learning.
2. To improve knowledge and understanding of Grammar.
3. To enhance the ability for making use of grammar in writing English.
4. To enrich communication skills among the students.
5. To develop their insight and positive attitude towards English language.
6. To impart LSRW skills and inculcate the habit of learning.
7. To build vocabulary.
8. To enhance employability skills.

COURSE OUTCOMES (COs)

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

1. To understand the rules of English grammar and their usage in writing English.
2. To use LSRW skills through the prescribed text and develop their ability to communicate effectively.
3. To get the mastery of language to express ideas, views, feelings and experience.
4. To communicate well among themselves.
5. To inculcate values and ideal characteristic qualities in themselves.

UNIT- I

Reading:

1. *All the World's a Stage* by William Shakespeare. (Act-II, Scene-VII).
2. *After Twenty Years* by O. Henry.

Writing: Nature and Style of Sensible Writing: Describing & Defining.

Speaking: Oral Communication (involves interactive practice sessions) Self -introduction and introducing a friend.

Listening: Listening activity (Present tense).

Vocabulary: The concept of word formation & root words from foreign languages.

Grammar: Subject – Verb Agreement. Sentence Structures & use of phrases and clauses in sentences. Identifying common errors in noun, pronoun and adjectives.

UNIT-II

Reading:

1. *I Have a Dream* Martin Luther King jr.
2. *Knowledge and Wisdom* by Bertrand Russell.

Writing: Importance of proper punctuation and creating coherence- Simple sentences.

Speaking: Expressing apology.
Listening: Listening activity. (Past tense)
Vocabulary: Prefixes and Suffixes.
Grammar: Identifying common errors in Articles, Modifiers and degrees of comparison.

UNIT- III
Reading:

1. Nelson Mandela (Biography)
2. "The Happy Prince" by Oscar wild.

Writing: Paragraph writing – letter writing.
Speaking: Situational dialogues.
Listening: Listening activity. (Future tense)
Vocabulary: Synonyms and Antonyms.
Grammar: Identifying common errors in Prepositions and Link words and complex sentences.

UNIT-IV
Reading:

1. *Where the Mind is without Fear* by Rabindra Nath Tagore.
2. Cause - Effect and Control Measures of Pollution (Air, Water, Noise) and Nuclear Hazards.

Writing: Essay writing - Organizing principles of essay writing - Introduction and Conclusion.
Speaking: Public speaking dynamics.
Listening: Listening activity. (Active voice and passive voice)
Vocabulary: Abbreviations and Acronyms.
Grammar: Identifying common errors in redundancies and compound sentences.

UNIT-V
Reading:

1. *The Road not Taken* by Robert Frost.
2. *An Astrologer's Day* by R K Narayan.

Writing: Techniques for writing precisely.
Speaking: Interviews and formal presentations.
Listening: speeches of A P J Abdul Kalam, Steve Jobs and so on.
Vocabulary: One-word substitutes.
Grammar: Identifying common errors in clichés.

Reference Books:

1. *Practical English Usage.* Michael Swan. OUP. 1995.
2. *Remedial English Grammar.* F.T. Wood. Macmillan. 2007.
3. *On Writing Well.* William Zinsser. Harper Resource Book, 200.
4. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press, 2006.
5. *Communication Skills.* Sanjay Kumar and Pushp Lata. Oxford University Press, 2011.
6. *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyd. Oxford University Press, 2005.
7. *Oscar Wilde,* Create Independence Publisher, Kindle Edition, 2017.
8. *The Complete Works of William Shakespeare*, Kindle Edition, 2017.
9. G. P. Editors, The Complete Works of William Shakespeare, Global Classic, 2018.
10. *Robert Frost*, Robert Frost Collection, Wider Publication, 2011.

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-	3	1.5

(18HS0802) CHEMISTRY LAB
(Common to all Branches)

COURSE OUTCOMES (COs)

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

1. Estimate rate constants of reactions from concentration of reactants/products as a function of time.
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyse a salt sample.

List Of experiments

1. Estimation of copper by EDTA method
2. Determination of chloride content of water
3. Determination of acidity of water sample.
4. Determination of alkalinity of water sample
5. Potentiometric determination of Fe2+ by potassium permanganate.
6. Determination of Viscosity of an oil by Redwood Viscometer
7. Determination of dissolved oxygen in a water sample by Winkler's method
8. Conductometric titrations of strong acid against strong base.
9. Chemical analysis of a salt
10. Synthesis of a polymer/drug Choice of 10-12 experiments from the following:

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3 1.5

(18HS0811) ENGLISH LAB

(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. To provide Computer Assisted Language Learning facility for the students on self-instructional method for improving language.
2. To improve the correct articulation as English is international language.
3. To enhance the communication skills with a variety of activities and practice sessions.

COURSE OUTCOMES (COs)

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

1. To recognize sounds of English language with different classifications.
2. To know phonetic transcription and phonemic symbols of English language.
3. To understand international accent and utilize the same in their daily conversation.
4. To crease confidence for public speaking, for facing interviews, for making effective oral presentations, for having discussions, and for delivering impromptu speeches.

Unit – I

a) Importance of Phonetics – Introduction, organs of speech, classification of sounds, and Phonetic transcriptions.

Unit – II

a) Syllable, Syllabification, Word stress, Stress Rules and Intonation.
b) Intonation (Falling, Raising, and fall-raise) - Pitch and Rhythm.
c) Influence of mother tongue (MTI) - Common Indian Variants in pronunciation.
d) Difference between British and American Pronunciation

Unit – III

a) Vocabulary building.
b) Functional English; Telephone skills; Giving Directions; Situational dialogues; Role play.
c) JAM, Oral presentation-Prepared and extempore and PPT presentation.

Unit – IV

a) Describing people, places, things and situations- Body language–- listening some

Unit – V

a) Preparation of resume (C.V) & Cover Letter.
b) Interview Skills - mock interviews.
c) Group Discussion, Debate and Dress code.

Minimum requirement for ELCS LAB

1. Computer Assisted Language Learning (CALL) Lab: The Computer Aided Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. The Communication Skills Lab with movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.
   System Requirement (Hardware component):
   Computer network with: LAN with minimum 60 multimedia systems with the following.
   Specifications:
   i) P- IV Processor
      a) Speed 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality.

Suggested Software

1. Clarity pronunciation power--- Part 1(sky pronunciation)
2. Clarity pronunciation power--- Part 2
3. K-Van Advanced Communication Skills.
4. Walden Info tech Software.

References Books:

1. *A Textbook of English Phonetics for Indian Students*, second edition T. Balasubramanian. (Mcmillian) 2012.
2. *A Course in Phonetics and spoken English*, DhamijaSethi, Prentice-hall of India Pvt. Ltd, 2000.
3. *Speaking English Effectively*, second Edition Krishna Mohan & NP Singh 2011 (Mcmillian).
4. *A Hand Book of English Laboratories*, E.Sureshkumar , P.Sreehari, Foundation books, 2011.
5. *Spring Board Success*, Sharada Koshik, Bindu Bajwa, Orient Black Swan, Hyderabad, 2010.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech -I Sem. (E.C.E.) **P C**

4 2

(18ME0301) WORKSHOP PRACTICE LAB

COURSE OBJECTIVES

The objectives of this course:

1. The course provides hands-on training in the trades of Carpentry, Fitting, House- wiring, Tin Smithy, and Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.

COURSE OUTCOMES (COs)

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

1. Utilize workshop tools for engineering practice.
2. Employ skills for the production a component for real time applications.
3. Appreciate the hard work and intuitive knowledge of the manual workers.

LIST OF EXPERIMENTS:

1. TRADES FOR EXERCISES:

a. Carpentry shop: Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, Cross lap joint, Mortise and tenon T joint, Bridle T joint from soft wood stock.

b. Fitting shop: Two joints (exercises) from: Square joint, V joint, Half round joint or Dovetail joint out of 100 x 50 x 5 mm M.S. stock.

c. Sheet metal shop: Two jobs (exercises) from: Tray, Cylinder, Hopper or Funnel from out of 22 or 20 gauge G.I. sheet.

d. House-wiring: Two jobs (exercises) from: Wiring for ceiling rose and two lamps (bulbs)with independent switch, two way switch, controls with or without looping, wiring for stair case lamp, wiring for water pump with single phase starter.

e. Foundry: Preparation of two moulds (exercises): for a single pattern and a double pattern.

f. Welding: Preparation of two welds (exercises): Single V butt joint, Lap joint, Double V butt joint or T fillet joint.

2. TRADES FOR DEMONSTRATION:

a. Plumbing
b. Machine Shop
c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

REFERENCES

1. *Engineering Work shop practice for JNTU*, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009
2. *Work shop Manual*, P.Kannaiah & K.L.Narayana, SciTech Publishers. 3.*Dictionary of Mechanical Engineering*, GHF Nayler, Jaico Publishing House.

Part B - IT WORKSHOP

COURSE OBJECTIVES

To provide students with hands-on experience in basic hardware, productivity tools and basic operating system installations.

COURSE OUTCOMES (COs)

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

1. Identify the basic computer peripherals.
2. Gain sufficient knowledge on assembling and disassembling a PC.
3. Learn the installation procedure of Windows and Linux OS.
4. Acquire knowledge on basic networking infrastructure.
5. Learn productivity tools like Word, Excel and Power point.
6. Acquire knowledge on basics of internet and worldwide web.

Task 1:

Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

Task 2:

A practice on disassembling the components of a PC and assembling them.

Task 3:

1. Basic DOS commands, Installation of MS windows.
2. Basic Linux Commands,Installation ofLinux.

Task 4:

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals). Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Productivity tools Task 5:

1. **MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

2. **Presentations:** Creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

3. **Spreadsheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6:

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

REFERENCES

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, PowerPoint & amp; Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & amp; Repairing PCs", Bigelows, TMH

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech -II Sem. (E.C.E.)

L	T	C
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(18HS0831) MATHEMATICS-II
(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

The objective of this course is to familiarize the prospective engineers with techniques in Multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:

COURSE OUTCOMES (COs)

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

1. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
2. To introduce effective mathematical tools for the solutions of differential equations that model physical processes.
3. To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.

UNIT- I

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS: Exact, linear and

Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT -II

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS: Second order

linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT- III

MULTIVARIABLE CALCULUS (INTEGRATION): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Triple integrals (Cartesian), orthogonal curvilinear coordinates.

UNIT- IV

COMPLEX VARIABLE – DIFFERENTIATION: Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary nalytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

UNIT -V

Complex Variable Integration: Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

TEXT BOOKS

1. *Higher Engineering Mathematics,* B.S.Grewal, Khanna publishers
2. *Engineering Mathematics Volume-I &III* by T.K.V. Iyengar, S.Chand publication

REFERENCES

1. *Engineering Mathematics*, volume-I&III, E. Rukmangadachari & E.Keshava Reddy Pearson Publishers
2. *Higher Engineering Mathematics* Ramana B.V., Tata McGraw Hill New Delhi, 11thReprint, 2010.
3. *Engineering Mathematics-I & III*, T.K.V.Iyengar S.Chand Publications.
4. *A Modern Introduction* D. Poole, Linear Algebra:, 2nd Edition, Brooks/Cole, 2005.
5. *A text book of Engineering Mathematics* N.P. Bali and Manish Goyal, , Laxmi Publications, Reprint, 2008.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech -II Sem. (E.C.E.)

L	T	C
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(18HS0851) SEMICONDUCTOR PHYSICS
(Common for ECE, CSE and CS&IT)

COURSE OBJECTIVES

The objectives of this course:

1. Basic concepts of free electron theory and energy bands in solids.
2. Key points, formation and importance of semiconductors.
3. Will Understanding working principles and applications of optoelectronic devices.
4. Will recognize the basic concepts related properties of Lasers and Optical Fibers..
5. To understand the fundamentals Nano materials.

COURSE OUTCOMES (COs)

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

1. Would understand the basic concepts of free electron theory and energy bands in solids.
2. Able to deliver importance of semiconductors.
3. Would understand working principles and applications of optoelectronic devices.
4. Able to explain concepts related to Lasers and Optical fibers. .
5. Understand the importance of Nanotechnology.

UNIT – I

ELECTRONIC MATERIALS: Free electron theory, density of states and energy band diagrams – Energy bands in solids – E – K band diagram, direct and indirect band gaps, types of electronic materials: metals, semiconductors and insulators – occupation probability – Fermi level – effective mass.

UNIT – II

SEMICONDUCTORS: Intrinsic and Extrinsic semiconductors – Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics) - Carrier generation and recombination - Carrier transport: diffusion and drift -Hall Effect- p -n junction – Metal semiconductors junction-Ohmic and Schottky Junctions.

UNIT –III

LIGHT EMITING DIODE (LED) & PHOTODETECTORS: Rate equations for carrier density – radiative and non - radiative recombination mechanisms in semiconductors – LED: structure, materials, characteristics and figure of merits.

Photo detectors – PIN and Avalanche diode and their structure, materials working principle and characteristics – Solar cell.- Principle and characteristics

UNIT – IV

LASERS AND FIBER OPTICS: Characteristics of laser beams, Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Semiconductor laser, applications of lasers in science, engineering and medicine.

Principle of fiber optics – acceptance angle and numerical aperture – types of fibre cables-loses in fiber optics – optical fiber communication system - applications of fiber optics.

UNIT-V

PHYSICS OF NANOMATERIALS: Introduction, significance of nano scale – surface area and quantum confinement- Quantum dot, Quantum well , Quantum wire -Synthesis of nano materials- Top Down Process- Ball Milling ; Bottom Up Process: Sol-Gel method– CNT-Properties of Graphene- Applications.

Reference books:

1. *Semiconductor optoelectronics, Physics and Technology* J. Singh, , McGraw-Hill Inc. (1995).
2. *Semiconductor devices: Physics and Technology* S.M. Sze, , Wiley (2008).
3. *Semiconductor optoelectronic devices* P. Bhattacharya, , Prentice Hall of India (1997).
4. *Fundamentals of photonics* B.E.A. Saleh and M.C, Tech, , John Wiley & Sons.
5. *Engineering Physics* – K.Thyagarajan, MC Graw Hill Education Private Ltd, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech -II Sem. (E.C.E.)

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(18EE0239) BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course:

1. To understand the nature of different circuit elements, fundamental laws and network Theorems.
2. Understand the operation of dc machines and single phase transformers.

COURSE OUTCOMES (COs)

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

1. Determine the equivalent impedance of given network by using network eduction techniques.
2. Determine the current through any element and voltage across any element
3. Apply the network theorems suitably.
4. Analyze the operating principles of electrical machines and transformer.

UNIT-I

DC Circuits : Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Transformers : Magnetic materials, BH characteristics, ideal and practical transformer, Equivalent circuit, losses in transformers, Regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV

Electrical Machines : Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, Starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and Working of synchronous generators.

UNIT-V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important

Characteristics for Batteries. Elementary calculations for energy consumption, Power factor improvement and battery backup.

TEXT BOOKS

1. "*Basic Electrical Engineering*", D. P. Kothari and I. J. Nagrath, Tata McGraw Hill,2010.
2. "*Basic Electrical Engineering*", D. C. Kulshreshtha, McGraw Hill, 2009.

REFERENCES

1. "*Fundamentals of Electrical Engineering*", L. S. Bobrow, Oxford University Press,2011.
2. "*Electrical and Electronics Technology*", E. Hughes, Pearson, 2010.
3. "*Electrical Engineering Fundamentals*", V. D. Toro, Prentice Hall India, 1989.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech. – II Sem.(E.C.E)

L	T	C
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(18CS0501) PROGRAMMING FOR PROBLEM SOLVING

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the core aspects of computer problem solving techniques*
2. *To understand the programming language constructs*
3. *To understand the programming paradigms*

COURSE OUTCOMES (COs)

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

1. *Able to design the flowchart and algorithm for real world problems*
2. *Able to learn and understand new programming languages*
3. *Able to construct modular and readable programs*
4. *Able to write C programs for real world problems using simple and compound data types*

UNIT I

OVERVIEW OF COMPUTERS AND C-PROGRAMMING: Description of Computer Hardware & Software.

Introduction to C:overview of C, executing a 'c' program, c-character set, constants, variables, data types, declaration of variables, assigning values to variables, managing input & output operations, operators and expressions, basics of algorithm and flow chart

UNIT II

DECISION&LOOPCONTROL STATEMENTS: Introduction, If Statement, If-else Statement, Nested- If-else Statement, Else if Ladder, Switch case – break – continue – go to Statement ,for loop, nested for loop, while loop, do-while, do-while statement with while loop

UNIT III

ARRAYS: Introduction, one-dimensional (1D)-Arrays, declaration and initialization of one-dimensional (1D)-Arrays, Two- dimensional (2D)-Arrays, initialization of Two-dimensional(2D)-Arrays, Multi-dimensional Arrays

FUNCTIONS: Introduction, need for user-defined functions, a multi function program, elements of user-defined functions, definition of functions, return values and types, category of functions, recursion, scope and life time of variables, preprocessor commands:#define, #include, multi file programs

UNIT IV

POINTERS: Introduction, understanding pointers, accessing address of a variable, declaring and initialization of pointer variables, accessing variable through pointers, chain of pointers, pointer expressions, pointer increment and scale factor, pointers and arrays, passing arrays to

functions, array of pointers, pointers as function arguments, functions returning pointers.
STRINGS: Introduction, declaring and initializing string variables, reading and writing strings, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings(array of strings)

UNIT V

STRUCTURES: Introduction , defining a structure , declaring structure variables ,accessing structure members, structure initialization, copying and comparing structure variables,

operations on individual members , arrays of structures ,arrays within structures, structures within structures, structures and functions, unions, typedef, enum
File Management in C: Introduction, Types of Files, Defining and Opening a File, Closing a File, Input / Output Operations on Files, Error handling during IO Operations, Random access to files, Command line arguments.

TEXT BOOKS

1. *C and Data Structures* – Ashok Kamthane Pearson education
2. *Programming in C and Data Structures* – E Balagurusamy – Mc GrawHill.

REFERENCES

1. *Computer Fundamentals and C Programming* - Dr. P. Chenna Reddy, ISBN: 9789351045885, Publisher: Pothi.com
2. *Programming in C, Second Edition* – Pradip Dey, Manas Ghosh, Oxford University Press.
3. *C from Theory to Practice*- George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
4. *Programming with C*- R S Bichkar- University Press.
5. *Programming in C and Data Structures*, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education. (UNIT-I)

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech -II Sem. (E.C.E.)

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2	1	3

(18CE0101) ENGINEERING MECHANICS

COURSE OBJECTIVES

The objectives of this course:

1. *To learn about forces and force systems and their applications.*
2. *To learn about friction and to use the concept of Friction.*
3. *To learn how to find centroid of different objects using Mathematical formula.*
4. *To learn how to find Moments of Inertia of different objects using Mathematical formula.*

COURSE OUTCOMES (COs)

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

1. *Construct free body diagrams and develop appropriate equilibrium equations.*
2. *Understand the concepts of friction and to apply in real life problems.*
3. *Determine the centroid for composite sections.*
4. *Determine the Moment of Inertia for composite sections.*

UNIT-I

FORCES & FORCE SYSTEMS: Fundamental Principles – Resolution and Composition of Forces and Equilibrium of Particles – Lami's Theorem - Principle of Transmissibility – Principles of Continuum - Types of Force Systems – Resultant of Coplanar, Concurrent and Non-Concurrent Force Systems -Varignon's Theorem - Equilibrium of Coplanar Force Systems – Types of Beams and Supports – Support Reactions.

UNIT-II

FRICTION: Types of Friction– Laws of Friction–Limiting Friction–Cone of Limiting Friction - Ladder Friction - Wedge, Screw jack and differential Screw Jack

UNIT-III

CENTROID: Centroids of Simple Figures (From Basic Principles) – Centroids of Composite Figures

CENTRE OF GRAVITY: Centre of Gravity of Simple Body -Centre of Gravity of Composite Bodies- Pappus Theorem

UNIT-IV

MOMENT OF INERTIA: Definition – Parallel Axis Theorem and Perpendicular Axis Theorem – Polar Moment of Inertia – Radius of Gyration – Moment of Inertia of Basic Shapes - Composite Sections - Simple Solids.

UNIT-V

ANALYSIS OF PERFECT TRUSSES: Types of Trusses – Perfect, Deficient and Redundant Trusses - Cantilever Trusses and Simply Supported Trusses – Analysis of Trusses using Method of Joints and Methods of Sections.

TEXT BOOKS

1. *A Textbook of Engineering Mechanics*,3rd Edition, Bhavikatti S S , New Age International, 2016.
2. *Engineering Mechanics*, Dr. R. K. Bansal, 4th Edition, Laxmi Publications, 2011.

REFERENCES

1. *Engineering Mechanics*, D.S. Kumar, 3rd Edition, S.K. KATARIA & SONS
2. *Singer's Engineering Mechanics: Statics and Dynamics*, 3rd Edition, K. Vijaya Kumar Reddy, J. Suresh Kumar, B.S. Publications, 2011.
3. *Engineering Mechanics: Statics*, 6th Edition, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2001.
4. *Engineering Mechanics: Dynamics*, 6th Edition, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2010.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech -II Sem. (E.C.E.) **P C**
3 1.5

(18HS052) PHYSICS LAB
(Common to All Branches)

Course Description:

Physics practical course is meant for making the students to gain practical knowledge to correlate with the theoretical studies. It covers experiments on principle of Mechanics and Optics, measurement of magnetic field and studying resonance using LCR circuit.

Objectives:

1. To explore the application of Interference and Diffraction by doing concerned experiments.
2. Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.
3. To understand the concept of energy gap, B-H curve and resonance phenomena in LCR circuits.
4. Develop an ability to apply the knowledge of physics experiments in the later studies.

Suggested list of experiments from the following: (Perform any EIGHT experiments from the following)

a. Determination of wavelengths of various colors of Mercury spectrum using Diffraction Grating – Normal Incidence method.
b. Determination of Dispersive power of prism.
c. Rigidity Modulus – Torsional Pendulum
d. Study of Resonance effect in Series and Parallel LCR circuit.
e. Determination of thickness of thin object by wedge method.
f. Determination of radius of curvature of Plano convex lens – Newton's Rings.
g. Determination of wavelength of a given laser source by using diffraction grating.
h. Determination of particle size using laser source.
i. Determination of energy gap of a semiconductor using p – n junction diode.
j. B- H curve.
k. Magnetic field along the axis of current carrying coil – Stewart & Gee's Method.
l. Determination of frequency of tuning fork - Melde's Apparatus.
m. Determination of Spring constant – Coupled Oscillator.
n. Study of Characteristics of Solar Cell.
o. Determination of Numerical Aperture of an Optical fiber.

REFERENCES

1. Engineering Physics practical – NU Age Publishing House, Hyderabad.
2. Engineering Practical Physics – Cengage Learning, Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech. – II Sem.(E.C.E.) **P** **C**
3 **1.5**

(18CS0503) PROGRAMMING FOR PROBLEM SOLVING LAB

COURSE OBJECTIVES
The objectives of this course:

1. To make the student learn C Programming language.
2. To make the student solve problems, implement those using C & C++ programming languages.
3. To strengthen the ability to identify and apply the suitable data structure for the given real world problem.

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. Apply problem solving techniques of C to find solution.
Use C language features effectively to implement solutions.
2. Use C++ language features effectively to solve problems.
3. Identify and develop apt searching and sorting technique for a given problem.
4. Identity, design and develop the appropriate data structure for a given problem or application.

Experiments List:
1. a) Acquainting students to "c" programming environment and DOS commands
   b) Calculate sum of three numbers using c-program
2. a) Swap(exchange) values of two integer variables using c-program
   b) Read an integer, a character and a float values through keyboard and display
   c) Check operators precedence and associativity using c-program
   d) Write a c-program using all basic data types of c language
3. a) Read 3 integer values through keyboard and display largest among them
   b) Read marks of 5 subjects obtained by a student through keyboard and display "fail" or "pass" message on console
   c) Using switch() statement implement arithmetic operations
4. a) Check whether entered number is prime number
   b) Display factorial of entered number
   c) Display all multiples of an entered number upto given value(n)
5. a) Generate fibonacci series upto entered number(n)
   b) Find out sum of the digits of a number
6. a) Find the binary equivalent of entered decimal number
   b) Generation multiplication table of entered number(n)
7. a) Calculate sum of two integer matrices
   b) Calculate product of two integer matrices
8. a) Create your header file by including 2 user(your) defined functions and include them in a c-program student
   b) Find out factorial of a number using recursive function

c) Find square of an entered number using "call by address(reference)" technique
d) A program that tells us purpose of few predefined functions in "math.h" header file

9. a) CFheck whether entered string is palindrome
   b) Write a program to sort the entered set of strings using structure concept
10. a) Count number of vowels, consonants, digits, white spaces and special characters in entered string(a line of text)
    b) Swap (exchange) values of two integer variables using pointers
11. a) For 3 students with 3 subjects, calculate total marks and grade obtained by each
    b) Read data from a file(text) and display it on the monitor
12. a) Copy contents of one file(text) to other created file
    b) Merge contents of two files(text) and store it in another created file

REFERENCES

1. *How to Solve it by Computer*, R.G. Dromey, Pearson.
2. *The C Programming Language*, Brian W. Kernighan, Dennis M. Ritchie, Pearson.
3. *Let us C* Yeswant Kanetkar, BPB publications
4. *Pointers in C*, Yeswant Kanetkar, BPB publications.
5. *Programming in C and Data Structures*, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

I B. Tech. – II Sem.(E.C.E.)

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(18HS0817) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

COURSE OBJECTIVES

The objectives of this course:

Impart basic principles of thought process, reasoning and inference. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. The course focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

Unit-1

- Basic structure of Indian Knowledge System: Astadash Vidya- 4 ved
- 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi.,)

Unit-2

- 6 Vedanga (Shisha, Kalppa, Nirukha, VYkaran, Jyothish & Chand)
- 4 Upanga (Dharma Shastra, Meemamsa, Purana & Tharka Shastra)

Unit-3

- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case studies

Unit-4

- Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec,Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain & Boudh
- Indian Linguistic Tradition –(Phonology, morphology, syntax and semantics)

Unit-5

- Indian Artistic Tradition - Chitra kala, Moorthi kala, Vasthu kala , Sthapthya, Sangeetha, Nruthya Yevam Sahithya
- Case studies

TEXT BOOKS

1. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
2. Swami Jitatmanand, *Modern Physics and Vedant*, Bharatiya Vidya Bhavan
3. Swami Jitatmanand, *Holistic Science and Vedant*, Bharatiya Vidya Bhavan
4. Fritzof Capra, *Tao of Physics*
5. Fritzof Capra, *The Wave of life*

REFERENCES

1. VN Jha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad, Arnakulam
2. *Yoga Sutra of Patanjali*, Ramakrishna Mission, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with Vyasa Bhashya*, Vidyanidhi Prakashan, Delhi 2016
3. RN Jha, *Science of Consciousness Psychotherapyand Yoga Practices*, Vidyanidh Prakashan, Delhi 2016
4. P B Sharma (English translation), *Shodashang Hridayan*
5. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
6. S.C. Chaterjee & D.M. Datta, *An Introduction to Indian Philosophy*, University of Calcutta, 1984
7. K.S. Subrahmanialyer, *Vakyapadiya of Bhartrihari, (Brahma Kanda)*, Deccan College Pune 1965
8. *Panini Shiksha*, MotilalBanarasidas
9. V.N. Jha, *Language, Thought and Reality*, Vasudevasharan AGRAWAL Kala yevam Samskruthi, Shithya Bhavan Elahabad, 1952
10. Pramod Chandra, *India Arts*, Howard Univ. Press, 1983
11. Krishna Chaitanya, *Arts of India*, Abhinav Publications, 1987
12. R. Nagaswamy, *Foundations of Indian Art*, Tamil Arts Academy, 2002

Pedagogy: Problem based learning, group discussions, collaborative mini projects.
Outcome: Ability to understand, connect up and explain basics of Indian traditional Knowledge in modern scientific perspective.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

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(18HS0834) MATHEMATICS-III

(Only For ECE)

COURSE OBJECTIVES

The objectives of this course:

To familiarize the prospective engineers with techniques in Numerical Methods, Transform Calculus & Partial Differential Equations. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

COURSE OUTCOMES (COs)

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

1. To introduce the tools of differentiation and integration of functions of numerical methods that is used in various techniques dealing engineering problems.
2. To develop the essential tool of Partial Differential Equations in a comprehensive manner.
3. To acquaint the student with mathematical tools needed in evaluating Transform Calculus and their usage.

UNIT- I

Numerical Method-I: Solution of polynomial and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, Interpolation using Newton's forward and backward difference formulae.

Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8rules.

UNIT- II

Numerical Method-II:Ordinary differential equations: Taylor's series, Euler and Runge-Kutta method of fourth order for solving first and second order equations.

Partial differential equations: Finite difference solution two dimensional Laplace equation.

UNIT- III

Transforms Calculus-I: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, Convolution theorem. Evaluation of integrals by Laplace transform, Solving ODEs by Laplace Transform method.

UNIT-IV

Transforms Calculus-II: Fourier transforms: Fourier sine and cosine transform, properties, inverse Fourier transforms, finite Fourier transforms.

UNIT-V

Partial Differential Equations: First order partial differential equations, solutions of first order linear and non-linear PDEs, Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method, Solution of one dimensional equation, Heat equation.

TEXT BOOKS

1. *Higher Engineering Mathematics*, B.S.Grewal, Khanna publishers.
2. Engineering *Mathematics I&II* by T.K.V. Iyengar, S.Chand publications.

REFERENCS

1. *Engineering mathematics* E.Rukmangadachari & E.Keshava Reddy, volume-I&II, Pearson Publishers
2. *Engineering Mathematics* Ramana B.V., Higher, Tata McGraw Hill New Delhi,11th Reprint, 2010.
3. *Engineering Mathematics-I & II*, T.K.V.Iyengar S.Chand Publications.
4. *A text book of Engineering Mathematics* N.P. Bali and Manish Goyal, , Laxmi Publications, Reprint, 2008.

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(18EC0401) ELECTRONIC DEVICES

COURSE OBJECTIVES

The objectives of this course:

1. Give understanding on the characteristics of the P-N junction diode, Special purpose devices, Applications of diodes in Electronic circuits.
2. Familiarize students with working and characteristics of BJT, FET and MOSFET and to design Biasing circuits and single stage amplifier circuits using low frequency model.

COURSE OUTCOMES (COs)

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

1. Demonstrate the knowledge in Electronic Devices, their Characteristics and Applications.
2. Analyze the Diode circuits, Transistor & FET biasing circuits of BJT and FET.
3. Design of Diode circuits and Transistor Amplifier circuits using BJT and FET.

UNIT- I

PN JUNCTION DIODE: Theory of PN Junction Diode, PN Junction diode - Zero Bias, Forward and Reverse Bias, V-I Characteristics; Energy Band structure of Open circuited PN Junction, Quantitative Theory of PN Diode , Diode Resistances, Diode Capacitances, Ideal Vs. Practical diode, Effect of Temperature on V-I Characteristics, Breakdown in P-N Junction Diodes; Applications, Junction Diode Switching Characteristics, Diode Clippers and Clampers.

UNIT -II

RECTIFIERS: Definition, Types: Half-wave Rectifier and Full-wave Rectifier (Qualitative and Quantitative analysis), Inductor Filter, Capacitor Filter, L-section Filter, CLC or π - section Filter, Comparison of Filters in terms of Ripple factors.

SPECIAL PURPOSE DEVICES: Zener Diode- Working, V-I characteristics, Zener Diode as Voltage Regulator; Varactor Diode, Tunnel Diode, Photo Diode, Solar Cell, LED.

UNIT- III

BIPOLAR JUNCTION TRANSISTOR: Construction, Working, Transistor Configurations: CE, CB and CC, Characteristics of Transistor in CE, CB and CC configurations, Breakdown in Transistors.

TRANSISTOR BIASING: Need for biasing, Operating point, DC and AC Load line analysis, Biasing methods- Fixed bias, Collector to Base bias, Self-bias, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability and Heat Sink.

UNIT- IV

SMALL SIGNAL LOW FREQUENCY TRANSISTOR AMPLIFIER ANALYSIS: Frequency Response of Amplifier, Transistor hybrid model, conversion of h-parameters, Generalized analysis of Transistor amplifier using h-parameter model, Analysis of CB, CE and CC amplifiers using Exact and Approximate h-parameter model, Analysis of CE Amplifier with Emitter resistance, Design of Single Stage RC Coupled Amplifier.

UNIT -V

FIELD EFFECT TRANSISTOR: Classification, JFET- Construction, Working and Characteristics of N-Channel JFET, JFET parameters; MOSFET- N-channel Enhancement and Depletion MOSFETs: Construction, Working and Characteristics; Comparison of BJT and FET; FET Biasing methods; Small Signal Model for FET, Analysis of CS and CD Amplifiers at Low frequencies.

IC FABRICATION PROCESS: – Manufacturing Process of Monolithic ICs, CMOS Fabrication Process.

TEXT BOOKS

1. Electronic Devices and Circuits– S.Salivahanan, N.Suresh Kumar, Third Edition, McGraw Hill Education (India) Private Limited, 2012.

2.Electronic Devices and Circuits– J. Millman, C. Halkias, Tata Mc-Graw Hill, 4th Edition, 2010.

REFERENCES

1. *Integrated Electronics*–Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.
2. *Micro Electronic Circuits*–Sedra and Smith, Fourth Edition, Oxford University Press, 2002.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

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(18EC0402) DIGITAL SYSTEM DESIGN

COURSE OBJECTIVES

The objectives of this course:

1. Familiarize the student with fundamental principles of digital design.
2. Acquire the skills to manipulate and examine Boolean algebraic expressions, logical operations, Boolean functions and their simplifications.
3. Acquaint with classical hardware design for both combinational and sequential logic circuits.
4. Acquaint with HDL & EDA Tools for Digital System Design.

COURSE OUTCOMES (COs)

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

1. Define different Number system and perform Number base conversions.
2. Design and analyze Combinational Logic Circuits.
3. Design and analyze modular Combinational Circuits with MUX / DEMUX, Decoder / Encoder.
4. Design and analyze synchronous sequential logic circuits.
5. Use HDL & EDA tools for digital logic design and simulation.

UNIT I

BINARY SYSTEMS: Binary Numbers, Octal and Hexadecimal Numbers, Number Base Conversions, Complements, Signed Binary Numbers, Binary Codes.

LOGIC SIMPLIFICATION: Review of Boolean algebra and DeMorgan's Theorem, SOP & POS forms, Canonical forms.

UNIT II

GATE – LEVEL MINIMIZATION AND COMBINATIONAL LOGIC: Karnaugh maps up to 5 variables, Tabular Minimization method, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, De coders, Encoders, Multiplexers, De-Multiplexers.

UNIT III

SEQUENTIAL LOGIC DESIGN: Building blocks like S-R, D FF, T FF, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Pseudo Random Binary Sequence generator, Clock generation.

UNIT IV

LOGIC FAMILIES AND SEMICONDUCTOR MEMORIES: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tri-state TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices PAL,PLA Logic implementation using Programmable Devices.

UNIT V

DESIGN ENTRY: Schematic, FSM & HDL, Different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

TEXT BOOKS

1. *Switching & Finite Automata theory* – Zvi Kohavi, TMH, 2nd Edition.
2. *Digital Design* – Morris Mano, PHI, 3rd Edition, 2006.
3. *Modern digital Electronics*-– R.P. Jain, Tata McGraw Hill, 4th edition, 2009
4. *VHDL*– Douglas Perry, Tata McGraw Hill, 4th edition, 2002.
5. *Digital Electronics*– An introduction to theory and practice", W.H. Gothmann, PHI, 2nd edition, 2006.
6. *Digital Circuits and Systems*– D.V. Hall, Tata McGraw Hill, 1989
7. *Digital System Design using VHDL*– Charles Roth, Tata McGraw Hill 2nd edition 2012.

REFERENCES

1. *An Engineering Approach to Digital Design* – Fletcher, PHI.
2. *Fundamentals of Logic Design*– Charles H. Roth, 5th Edition, 2004, Thomson Publications.
3. *Digital Logic Applications and Design* – John M. Yarbrough, 2006, Thomson Publication

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(18EC0403) SIGNALS & SYSTEMS

COURSE OBJECTIVES

The objectives of this course:

1. Study about signals and systems.
2. Do the analysis of signals & systems (continuous and discrete) using time domain & frequency domain methods.
3. Understand the stability of systems through the concept of ROC.
4. Know various transform techniques in the analysis of signals and systems.

COURSE OUTCOMES (COs)

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

1. Analyze different types of signals.
2. Represent continuous and discrete systems in time and frequency domain using different transforms.
3. Investigate the system stability.
4. Sampling and reconstruction of a signal.

UNIT I

INTRODUCTION TO SIGNALS AND SYSTEMS: Classification of signals - Energy and Power signals, Continuous and Discrete time signals, Continuous and Discrete amplitude signals, Periodic and Aperiodic, Deterministic and Random, Complex exponential and Sinusoidal signals, Elementary Signals, Operations on signals, Systems: Definition and Classification, Illustrative examples.

UNIT II

FOURIER SERIES: Representation of Fourier series, Properties of Fourier series, Dirichlet‘s conditions, Trignometric Fourier Series and Exponential Fourier series, Discrete Time Fourier Series-properties, Illustrative examples.

FOURIER TRANSFORM: Deriving Fourier Transform from Fourier Series, Fourier Transform of standard signals, Magnitude and Phase response, Properties of Fourier Transform, Fourier Transform of Periodic signals, Discrete Time Fourier Transform-properties, Illustrative examples.

UNIT III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Linear system, Impulse response, Step response, Response of a Linear system, Linear Time-Invariant (LTI) system, Linear Time Variant (LTV) system, Linear Shift-Invariant (LSI) systems, LTI System properties, Characterization of Causality and Stability of linear Shift-Invariant Systems, Transfer function of a LTI system, Filter characteristics of Linear systems, Relation between

Continuous and Discrete time systems.

SAMPLING: The Sampling Theorem, Spectra of sampled signals, Impulse sampling, Reconstruction of signal from its samples-Ideal reconstruction filter, Aliasing effect.

UNIT IV

CONVOLUTION AND CORRELATION OF SIGNALS: Concept of Convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transform, Cross correlation and Auto correlation of functions, Properties of correlation function, Energy Density Spectrum, Parseval's theorem, Power Density Spectrum, Detection of Periodic signals in the presence of noise by correlation, illustrative examples.

UNIT V

LAPLACE TRANSFORM: Laplace transform (LT), Region of convergence, Constraints on ROC for various classes of signals, poles and zeros of system, Laplace domain analysis, solution to differential equations, Properties of LT, relation between LT and FT of a signal, illustrative examples.

Z–TRANSFORM: The z-Transform for discrete time systems, Distinction between Laplace, Fourier and z-transforms, Region of convergence in z-transform, constraints on ROC for various classes of signals, Inverse z-transform, properties of z-transforms, illustrative examples.

TEXT BOOKS

1. *Signals and Systems*– A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edition.
2. *Signals, Systems & Communications*– B.P. Lathi, 2009, BS Publications.

REFERENCES

1. *Signals and Systems*– A. Anand Kumar, Phi
2. *Signals and Systems Analysis using Transform methods and MATLAB*–M. J.Roberts, TMH, 2003.
3. *Linear Systems and Signals* – B. P. Lathi, Second Edition, Oxford University press, 2008.
4. *Fundamentals of Signals and Systems*– Michel J. Robert, MGH International Edition, 2008.
5. *Signals and Systems*– J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, TMH

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(18EE0242) NETWORK THEORY

COURSE OBJECTIVES

The objectives of this course:

1. To understand the nature of different circuit elements, fundamental laws and network Theorems.
2. To analyze transients in Electrical systems.
3. To evaluate Network parameters of given Electrical network.
4. To understand about phasor concepts of single phase and Magnetic circuits.
5. To understand the concepts of Resonance and fourier transforms.

COURSE OUTCOMES (COs)

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

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Determine the transient response of R-L, R-C, R-L-C circuits for dc and ac excitations.
3. Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources.
4. Design different types of filters.

UNIT-I

CIRCUIT ANALYSIS TECHNIQUES: Node and Mesh Analysis, super node and super mesh for DC excitation, Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks source transformation. Network theorems: reciprocity, Maximum power Transfer, compensation and Tallegen's, millman’s theorem as applied to DC and AC circuits.

UNIT- II

RESONANCE AND FILTERS: Resonance: Series, Parallel resonance, Concept of Bandwidth and Q Factor.

Filters: Introduction, the Neper & decibel, The constant – k low pass filter, the constant – k high pass filter, band Pass Filters, band reject filters - illustrated problems.

UNIT- III

TRANSIENT ANALYSIS: DC Transient Analysis: Transient Response of R-L, R-C, R-L-C Series Circuits for DC Excitation- Initial Conditions-Solution Method Using Differential Equation and Laplace Transforms, Response of R-L & R-C Networks to Pulse Excitation.
AC TRANSIENT ANALYSIS: Transient Response of R-L, R-C, R-L-C Series Circuits for Sinusoidal Excitations-Initial Conditions-Solution Method Using Differential Equations and Laplace Transforms.

UNIT- IV

TWO PORT NETWORKS: Two Port Network Parameters: Impedance, Admittance, Transmission and Hybrid Parameters and their Relations. Concept of Transformed Network, Two Port Network Parameters Using Transformed Variables.

UNIT- V

FOURIER TRANSFORMS: Trigonometric and exponential Fourier series, Line spectra and phase spectra, symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, Fourier transform and properties of the Fourier transform.

TEXT BOOKS

1. *Network analysis* Van, Valkenburg.; ; Prentice hall of India, 2000.
2. *Circuits and Networks* Sudhakar, A., Shyammohan, S. PTata McGraw-Hill New Delhi, 1994.

REFERENCES

1. *Engineering Circuit Analysis* A William Hayt, 8th Edition, McGraw-Hill Education.
2. *Electric circuit analysis, by* C.L.Wadhwa, new age international.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

II B. Tech -I Sem. (E.C.E.) **P** **C**

3 **1.5**

(18EC0404) ELECTRONIC DEVICES LAB

COURSE OBJECTIVES

The objectives of this course:

1. Make the student understand the working of various Semiconductor devices and plot their characteristics.
2. Obtain the frequency response characteristics of BJT and FET amplifiers.

COURSE OUTCOMES (COs)

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

1. Know various semiconductor devices and their use in Real time applications.
2. Find the Frequency response characteristics of BJT and FET amplifiers and determine Bandwidth.

Electronic workshop practice (for 2 Lab sessions)

1. Identification, Specifications and Testing of passive & active components
2. Study the working of the electronic equipment used in the lab.

List of Experiments

(Minimum of **TEN** experiments to be completed)

CYCLE-I

1. Forward and Reverse bias characteristics of P-N Junction diode
2. Zener diode characteristics
3. Diode clippers
4. Diode clampers
5. Half Wave Rectifier with and without filter
6. Full Wave Rectifier with and without filter

CYCLE –II

7. Input and Output characteristics of Transistor in CB Configuration
8. Input and Output characteristics of Transistor in CE Configuration
9. Drain and Transfer Characteristics of n-channel JFET
10. Frequency response of CE Amplifier
11. Frequency response of CC Amplifier
12. Frequency response of Common Source FET Amplifier

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(18EC0405) DIGITAL SYSTEM DESIGN LAB

COURSE OBJECTIVES

The objectives of this course:

1. Get familiar with basic Logic gates
2. Acquaint with classical hardware design for both combinational and sequential logic circuits
3. Acquaint with HDL & EDA Tools for Digital System Design

COURSE OUTCOMES (COs)

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

1. Design and analyze Combinational Logic Circuits
2. Design and analyze modular Combinational Circuits with MUX / DEMUX, Decoder/ Encoder
3. Design and analyze synchronous sequential logic circuits
4. Use HDL & EDA tools for digital logic design and simulation

List of Experiments

CYCLE-1

1. Verify the truth tables of AND, OR, NOT, NAND, NOR Gates.
2. Design & Verify the truth tables of Half Adder & Full Adder using logic gates.
3. Design & Verify the truth tables of 4- bit binary adder / subtractor using logic gates.
4. Design & Verify the truth tables of Multiplexer and De-Multiplexer.
5. Design & Verify the truth tables of Encoder and Decoder using logic gates.
6. Design & Verify Magnitude comparator.

CYCLE-II

7. Design of RS & JK FF using NAND gates.
8. Design & implement of Shift Register.
9. Design & implement of Synchronous counters.
10. Simulation of (Exp1 to 6) combinational circuits using VHDL
11. Simulation of (Exp 6,7,8) Sequential circuits using VHDL

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(18EC0406) SIGNAL AND SYSTEMS SIMULATION LAB

LIST OF EXPERIMENTS:

(Minimum of Twelve experiments to be conducted)

CYCLE-I

1. Basic operations on matrices
2. Generation of various signals and sequences
3. Operations on Signals and Sequences
4. Finding the Even and Odd parts of signal and sequence and real and imaginary parts of signal
5. Convolution of Sequences
6. Autocorrelation and Cross correlation of signals
7. Verification of Linearity and Time Variant and Invariant properties of a given discrete system

CYCLE-II

8. Computation of Unit Sample, Unit Step and Sinusoidal Responses of the given LTI System
9. Gibbs Phenomenon
10. Finding the Fourier Transform of a given signal
11. Waveform synthesis using Laplace Transform
12. Generation of Gaussian Noise
13. Sampling Theorem verification
14. Removal of Noise by Auto Correlation / Cross correlation in a given signal corrupted by noise

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(18HS0816) INDIAN CONSTITUTION

COURSE OBJECTIVES

The objectives of this course:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals 'constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT-1

- Meaning of the Constitution Law

UNIT-2

- Historical Perspective of the Constitution of India
- Salient features and characteristics of the Constitution of India

UNIT-3

- Scheme of the fundamental rights
- The scheme of the Fundamental Duties and its legal status
- The Directive Principles of State Policy – Its importance and implementation
- Federal structure and distribution of legislative and financial powers between the Union and the States

UNIT-4

- Parliamentary Form of Government in India – The constitution powers and status of the President of India.
- Amendment of the Constitutional Powers and Procedure.
- The historical perspectives of the constitutional amendments in India.
- Emergency Provisions : National Emergency, President Rule, Financial Emergency

UNIT-5

- Local Self Government – Constitutional Scheme in India.
- Scheme of the Fundamental Right to Equality.
- Scheme of the Fundamental Right to certain Freedom under Article 19
- Scope of the Right to Life and Personal Liberty under Article 21

TEXT BOOKS

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015

REFERENCES

1. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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(18EC0407) ANALOG CIRCUITS

COURSE OBJECTIVES

The objectives of this course:

1. To familiarize the student with the analysis of Small signal Amplifiers at High Frequencies, Multistage amplifiers with compound connections, Feedback amplifiers, Oscillators, Power amplifiers and Tuned amplifiers.
2. To introduce the basic building blocks of linear integrated circuits.

COURSE OUTCOMES (COs)

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

1. Analyze and design BJT single stage and multi stage amplifiers, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.
2. Understand the basic building blocks of linear integrated circuits.

UNIT- I

SMALL SIGNAL HIGH FREQUENCY TRANSISTOR AMPLIFIER ANALYSIS AND MULTISTAGE AMPLIFIERS

BJT Transistor at high frequencies, Hybrid- π Common Emitter transistor model and its parameters, CE short circuit current gain, Current gain with resistive load, Methods of coupling**,** Cascade transistor amplifier and its analysis, Cascode amplifier, Darlington pair and its analysis, Effect of cascading on Bandwidth.

UNIT- II

FEEDBACK AMPLIFIERS: Feedback concept, types of feedback, Amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier, feedback amplifier topologies, characteristics of negative feedback amplifiers, Analysis of feedback amplifiers, Performance comparison of feedback amplifiers.

OSCILLATORS: Principle of operation, Barkhausen Criteria, types of oscillators, Analysis of RC-phase shift and Wien bridge oscillators using BJT, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators with BJT, Crystal oscillators, Frequency and amplitude stability of oscillators.

UNIT- III

POWER AMPLIFIERS: Types, Class A large signal Amplifiers, Transformer Coupled Audio power amplifier- Efficiency, Class B Amplifiers, Efficiency, Complementary Symmetry push pull amplifier, Crossover Distortion.

TUNED AMPLIFIERS

Introduction, Single Tuned Amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers.

UNIT- IV

OPERATIONAL AMPLIFIER: Basic Information of Op-Amp, Inverting and Non inverting , Voltage Follower, CMRR, Operational Amplifier Internal Circuit, Differential Amplifier, Transfer Characteristics, Scale Changer, Summing Amplifier, Subtractor, Instrumentation Amplifier, Sample and Hold Circuit, Differentiator, Integrator, Schmitt Trigger.

UNIT- V

OP-AMP APPLICATIONS: Active filters: Low pass, high pass, band pass and band stop, Design guidelines, DAC – Weighted Resistor DAC, R-2R ladder DAC, Inverted R-2R Ladder DAC, ADC – Flash Type ADC, Successive Approximation ADC, Dual Slope ADC, DAC/ADC Specifications.

TEXT BOOKS

1. *Electronic Devices and Circuits*– Salivahanan, N.Suresh Kumar, McGraw Hill Education, Third Edition.
2. *Linear Integrated Circuits*– D.Roy Choudhury, Shail B.Jain, New Age International Publishers, Fourth Edition, 2010.

REFERENCES

1. *Micro Electronic Circuits*– Sedra A.S. and K.C. Smith, Oxford University Press, 4th Edition.
2. *Electronic Devices and Circuits*– Jacob Millman, Christos C.Halkias, Tata McGraw Hill Edition, 1991.

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(18EC0408) ANALOG COMMUNICATIONS

COURSE OBJECTIVES

The objectives of this course:

1. To study the fundamental concepts of the analog communication system.
2. To analyze various analog modulation and demodulation techniques.
3. To know the working of various transmitters and receivers.
4. To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.

COURSE OUTCOMES (COs)

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

1. Acquire knowledge on the basic concepts of Analog Communication Systems.
2. Analyze the analog modulated and demodulated systems.
3. Verify the effect of noise on the performance of communication systems.
4. Know the fundamental concepts of information and capacity.

UNIT- I

Introduction: Elements of communication systems, Modulation, Modulation Methods and its need, Frequency mixer, EM Spectrum and its Applications.

Amplitude Modulation & Demodulation: DSB-FC(AM)modulation & its demodulation, Generation of AM signals, sideband and carrier power of AM, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Features of Vestigial sideband (VSB)modulation, Comparison of various amplitude modulation techniques, AM Transmitters, Illustrative Problems.

UNIT- II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation, Generation of FM waves – Indirect method, Direct method. Demodulation of FM, Pre-emphasis& De-emphasis filters, Non-linear effects in FM systems, FM Transmitter, Illustrative Problems.

UNIT- III

Noise in Communication Systems: Types of noise, Time domain representation of narrowband noise, filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Noise equivalent bandwidth, Effective noise temperature, and Noise figure. Performance analysis (i.e. finding SNR expression) of AM,

DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

UNIT- IV

Analog pulse modulation schemes and Multiplexing Techniques: Pulse amplitude modulation (PAM) & demodulation, synchronization in PAM modulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations and demodulation schemes, Multiplexing Techniques.

UNIT- V

Radio Receivers & Information theory: Sensitivity, Selectivity, and Fidelity. Super-heterodyne AM & FM receivers.

Information theory: Introduction, Information content of message, Entropy, mutual information, and channel capacity theorem, Shannon's encoding algorithm.

TEXT BOOKS

1. *Communication Systems*, Simon Haykin,Wiley-India edition, 2nd edition, 2010.
2. *Communication Systems – An Introduction to Signals & Noise in Electrical Communication*,A. Bruce Carlson, & Paul B. Crilly, MGH, 5th Edition, 2010.

REFERENCES

1. Principles of Communication Systems,Herbert Taub& Donald L.Schilling, Tata McGraw-Hill, 3rd Edition, 2009.
2. Principles of Communication-Systems Modulation & *Noise*, R.E. Ziemer& W.H. Tranter, Jaico Publishing House, 2001.
3. *Electronics & Communication System*,George Kennedy and Bernard Davis, TMH, 2004.
4. *Electronic communication systems fundamentals through advanced*,Wayne thomasi 4th edition.

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(18EC0409) PROBABILITY THEORY AND STOCHASTIC PROCESSES

COURSE OBJECTIVES

The objectives of this course:

1. To understand the concepts of a Random Variable and operations that may be performed on a single Random variable.
2. To understand the concepts of Multiple Random Variables and operations that may be performed on Multiple Random variables.
3. To understand the concepts of Random Process and Temporal & Spectral characteristics of Random Processes.

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to determine the temporal and spectral characteristics of random signal response of a given linear system.

UNIT -I

PROBABILITY: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Baye's Theorem, Independent Events.

THE RANDOM VARIABLE : Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

UNIT- II

MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT- III

RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationary and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationary, (N-Order) and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT- IV

RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Spectrum:

Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT -V

LINEAR SYSTEMS WITH RANDOM INPUTS: Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.

TEXT BOOKS

1. *Random Variables & Random Signal Principles* Peyton Z. Peebles,"Probability,", TMH, 4th Edition,
2. *Probability, Random Variables and Stochastic Processes,* Athanasios Papoulis and Unnikrishna Pillai, PHI, 4th Edition, 2002.
3. *Probability Theory & Stochastic Processes,* Y.Mallikarjuna Reddy,4th edition.

REFERENCES

1. *Communication Systems Analog & Digital* R.P. Singh and S.D. Sapre, TMH, 1995.
2. *Probability and Random Processes with Application to Signal Processing* Henry Stark and John W.Woods, Pearson Education, 3rd Edition.
3. *Probability Methods of Signal and System Analysis* George R. Cooper, Clave D. MC Gillem, Oxford, 3rd Edition, 1999.
4. *Statistical Theory of Communication* S.P. Eugene Xavier, Statistical Theory of Communication, New Age Publications, 2003.
5. *Signals, Systems & Communications* B.P. Lathi, , B.S. Publications, 2003.

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(18HS0812) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES

The objectives of this course:

Equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to enrich analytical skills in helping them take sound financial decisions for achieving higher productivity.

COURSE OUTCOMES (COs)

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

thorough understanding of Managerial Economics and Analysis of Financial statements facilitates the technocrats –cum- entrepreneurs to take up decisions effectively and efficiently in the challenging Business Environment.

UNIT- I

INTRODUCTION TO MANAGERIAL ECONOMICS: Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance –Types – measurement of elasticity of demand – Demand forecasting- factors governing demand Forecasting- methods of demand forecasting –Relationship of Managerial Economics with Financial Accounting and Management.

UNIT- II

THEORY OF PRODUCTION AND COST ANALYSIS: Production Function – Short-run and long- run production - Isoquants and Iso costs, MRTS, least cost Combination of inputs - Cobb-Douglas production function - laws of returns – Internal and External Economies of scale - **Cost Analysis**: Cost concepts - Break-Even Analysis (BEA) –Managerial Significance and limitations of BEA - Determination of Break Even Point (Simple Problems).

UNIT III

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT: Market

structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly - Monopolistic competition. Price-Output determination - Pricing Methods and Strategies. New Economic Environment- Economic systems – Economic Liberalization – Privatization and Globalization

UNIT- IV

CAPITAL AND CAPITAL BUDGETING: Concept of Capital - Over and under capitalization – Remedial measures - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital Budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems).

UNIT- V

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS: Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account –Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

TEXT BOOKS

1. *Managerial Economics and Financial Analysis* Aryasri, 4/e, TMH, 2009.
2. *Managerial Economics*, Sultan Varshney & Maheswari, Chand, 2009.

REFERENCES

1. *Financial Accounting and Analysis* Premchand Babu, Madan Mohan:, Himalaya, 2009
2. *Economics and Financial Analysis* S.A. Siddiqui and A.S. Siddiqui: Managerial, New Age International, 2009.
3. *Principles of Business Economics* Joseph G. Nellis and David Parker, Pearson, 2/e, New Delhi.
4. *Managerial Economics in a Global Economy* Domnick Salvatore, Cengage, 2009.
5. *Managerial Economics* H.L.Ahuja, S.Chand, 3/e, 2009

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(18HS0803) BIOLOGY FOR ENGINEERS
(Common to all Branches)

COURSE OBJECTIVES

The objectives of this course:

1. Describe how biological observations of 18th Century that lead to major discoveries.
2. Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
3. Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
4. Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine

COURSE OUTCOMES (COs)

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

1. Classify enzymes and distinguish between different mechanisms of enzyme action.
2. Identify DNA as a genetic material in the molecular basis of information transfer.
3. Analyse biological processes at the reductionistic level
4. Apply thermodynamic principles to biological systems.
5. Identify and classify microorganisms.

UNIT- I

INTRODUCTION & CLASSIFICATIONS OF ORGANISMS: Introduction - classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilisation -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms - study of different groups - E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus.

UNIT- II

GENETICS PURPOSE

Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis- Concepts of recessiveness and dominance - Concept of mapping of phenotype to genes - single gene disorders in humans - Complementation in human genetics.

UNIT -III

BIOMOLECULES PURPOSE & ENZYMES PURPOSE: Building blocks of Molecules of life & it's types. Introduction & Concepts- Monomer units and polymeric structures,

Sugars, starch, cellulose, Amino acids, proteins, Nucleotides, DNA/RNA, Two carbon units and lipids. Role of catalysis life in existed on earth Enzymology: Enzyme classification. Mechanism of enzyme action. Enzyme kinetics and kinetic parameters related to Biology. RNA catalysis. Classifications and Procedure for Enzyme catalysed reactions with two examples.

UNIT- IV

INFORMATION TRANSFER PURPOSE & MACROMOLECULAR ANALYSIS

PURPOSE: Molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. Genetic material of DNA, Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Introduction and Explanation of genetic code and degeneracy of genetic code. Gene - complementation and recombination.

Biological processes at the reductionist level Proteins - structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

UNIT- V

METABOLISM PURPOSE: The principles of energy transactions - in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency- including breakdown of glucose to CO2 + H2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions.

Microbiology -single celled organisms -species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.

REFERENCES

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd

2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H.John Wiley and Sons

3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown

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(18EC0410) ANALOG CIRCUITS LAB

COURSE OBJECTIVES

The objectives of this course:

1. To understand the analysis of single stage and multi stage amplifiers.
2. To construct feedback amplifiers, oscillators, power amplifier and Tuned Amplifier.
3. To design electronic circuits using Op Amp.

COURSE OUTCOMES (COs)

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

1. Construct and simulate various single stage, multi stage amplifiers, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.
2. Design various electronic circuits using op Amp.

List of Experiments:

(Minimum of Twelve experiments to be conducted)

CYCLE-I

1. A two stage RC coupled amplifier
2. Darlington pair amplifier
3. Voltage series feedback amplifier
4. RC phase shift oscillator using BJT
5. Colpitts oscillator using BJT
6. Class A power amplifier (Transformer less)
7. Single tuned voltage amplifier

CYCLE-II

8. Inverting and non-inverting amplifier using Op-Amp
9. Differential amplifier using Op-Amp
10. Integrator and Differentiator using Op-Amp
11. Active Lowpass filter using Op-Amp
12. Active Highpass filter using Op-Amp
13. Schmitt trigger using Op-Amp
14. DAC – Weighted Resistor & R-2R ladder DAC,

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(18EC0411) ANALOG COMMUNICATIONS LAB

COURSE OBJECTIVES

The objectives of this course:

To experience real time behavior of different analog & digital modulation schemes

COURSE OUTCOMES (COS):

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

1. Technically visualize spectra of different analog modulation schemes
2. Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.
3. Measure characteristics of radio receiver measurements.

List of Experiments:
(All Experiments are to be conducted)

CYCLE-I

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Phase modulation and demodulation.
4. Characteristics of Mixer.
5. Pre-emphasis & de-emphasis

CYCLE-II

6. Pulse amplitude modulation & demodulation.
7. Pulse width modulation & demodulation
8. Pulse position modulation & demodulation.
9. Radio receiver measurements – sensitivity selectivity and fidelity.
10. Time division multiplexing

Equipment required for the Laboratory:

1. Regulated Power Supply equipment's 0 – 30 V
2. CROs 0 – 20 M Hz.
3. Function Generators 0 – 3 M Hz
4. Multimeters
5. Required electronic components (active and passive) for the design of experiments.
6. Radio Receiver Demo kits or Trainers.

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(18HS0804) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES

The objectives of this course:

1. Students have got an idea about the importance of pollution free air, water, soil and food.
2. They know about global environmental problems like Acid Rains, Global Warming, Green House Effects, Ozone layer depletion.
3. To understand the impacts of developmental activities and mitigation measures along with the environmental policies and regulations.
4. To recognize major concepts in environmental studies and demonstrate in-depth understanding the environment.

COURSE OUTCOMES (COs)

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

1. Based on this course, the Engineering Student will be able to understand/evaluate/develop technologies on the basis of Ecological principles and environmental regulations along with Legislation, Laws and Policies which in turn help in sustainable development.
2. Take preventive measures to reduce air, water, soil pollutions and contaminants in food.
3. Effectively carry out waste disposal at individual level.
4. Involve in preservation of natural resources.

UNIT- I

INTRODUCTION: Definition, Scope and Importance-Need for Public Awareness **NATURAL RESOURCES:** Classification of resources-Forest resources: Use and over-exploitation, deforestation- Mining, dams and their effects on forests and tribal people – Water resources - Use and over utilization of surface and ground water- Floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources –Energy resources: Renewable and Non- Renewable sources of energy- Solar energy, Hydro electrical energy, Wind energy, Nuclear energy, etc.

UNIT-II

ECOSYSTEMS: Concept of an ecosystem– structural features of ecosystem- Producers, Consumers and Decomposers–-Biogeochemical cycles- Ecological succession-Food chains, food webs and ecological pyramids – Energy flow in the ecosystem-Types of ecosystems
(a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems.

UNIT-III

BIODIVERSITY AND ITS CONSERVATION: Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega-diversity Nation, Hot spots of biodiversity, Value of biodiversity, threats to biodiversity, endemic, endangered and extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

UNIT-IV

ENVIRONMENTAL POLLUTION AND GLOBAL ENVIRONMENTAL ISSUES:

Natural Disasters: Droughts, Floods, Cyclone, Landslides, Earthquake, Pollution episodes: Air pollution, Water pollution, Land pollution, Noise pollution, Automobile pollution and Nuclear pollution –Effects-Global warming, Acid Rain and Ozone layer depletion and controlling measures.

Global Environmental Issues: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment

Solid Waste Management: causes, effects and control measures of Municipal solid wastes – E-waste and management, Role of an individual in prevention of pollution – pollution case studies.

UNIT-V

ENVIRONMENTAL LEGISLATION, LAWS, POLICIES FOR SUSTAINABLE

DEVELOPMENT: Environmental Legislation, Environmental Protection act – Air Prevention and Control of Pollution act–Water Prevention and control of Pollution act– Wildlife protection act – Forest conservation act – Municipal Solid Waste management, International conventions/Protocols: Earth summit, Kyoto protocol and Montreal Protocol. From Unsustainable to sustainable development, Role of NGO's for Sustainable development, Concepts of Green belt development, Role of IT in Environment-Remote Sensing and GIS methods for Sustainable development.

Field work- visit to a local area to document environmental assets-river forest grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture)- study simple ecosystems (pond/river/hill slopes)

TEXT BOOKS

1. *Environmental Sciences* A.Kaushik and C.P.Kaushik, , 5th edition, New age international publishers, 2015.
2. *Text Book of Environmental Science and Technology* by M.Anji Reddy, BS Publications.

REFERENCES

1. *Environmental Studies* Anil Kumar and Arnab Kumar De, , New Age International Publishers, New Delhi, 3rd Edition 2015.
2. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards R.K. Trivedi, Vol.I and II, Enviro Media.

3. *Environmental Studies* by Dr.K.Mukkanthi, S.Chand Publishers.
4. *Environmental Studies-From Crisis to Cure* Rajagopalan.R, Oxford University Press, 2005.
5. *Text Book of Environmental Studies* Erach Bharucha, 2010, University Grants Commission, University Press (India) Pvt.Ltd., Hyderabad

E-learning resources:

1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/

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(18EE0211) CONTROL SYSTEMS

COURSE OBJECTIVES
The objectives of this course:

1. *The students should learn how to represent system by transfer function and block diagram reduction method and Mason's gain formula.*
2. *The students should able to learn time response analysis and demonstrate their knowledge to frequency response.*
3. *Students can be able to learn stability analysis of system using Root locus, bode plot, polar plot, and Nyquist plot.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Identify open and closed loop control system.*
2. *Formulate mathematical model for physical systems and simplify representation of complex systems using reduction techniques.*
3. *Use standard test signals to identify performance characteristics of first and second-order systems.*
4. *Apply root locus technique for stability analysis.*
5. *Analyze performance characteristics of system using Frequency response methods.*
6. *Develop and analyze state space models.*

UNIT - I
Control Systems Concepts: Introduction to linear Control Systems, Classification of control systems - Open loop and Closed loop control systems, transfer function, mechanical, electrical systems and electro mechanical systems, electrical analogous systems. Block diagram, signal flow graph.

UNIT- II
Time Response Analysis - Standard test input signals – Time response - Time domain specifications, Transient and steady state response of first and second order systems- Error constants, Steady state error and generalized error constants–- proportional, integral and derivative Controllers.

UNIT-III
Stability Analysis In Control Systems: Concept of stability – Routh's and Hurwitz stability criterion –.Root Locus concept- effects of adding poles and zeros of G(s)H(s) on the root loci.

UNIT-IV

Frequency Response Analysis: Frequency domain specifications, correlation between frequency domain and time domain, Frequency response plots- BIBO stability, Bode Plots, Polar plots, Nyquist Plots, Gain margin and Phase margin – Stability Analysis. Lead, Lag and Lag-lead compensators.

UNIT-V

State Space Analysis: state, state variables and state model, diagonalization, solution of state equations - State transition matrix and it's properties. Concept of controllability and observability.

TEXT BOOKS

1. I. J. Nagrath and M. Gopal, *Control Systems Engineering,* New Age International Limited, Publishers, 2nd edition. 2008.
2. A. Nagoor Kani, *Control Systems,* RBA Publications, 2nd Edition, 2009.

REFERENCES

1. A. Anand Kumar, *Control Systems,* Eastern Economy Edition -PHI learning Private Ltd. 2011.
2. Benjamin C. Kuo, *Automatic Control Systems,* Wiley, 2014.

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(18EC0412) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

COURSE OBJECTIVES
The objectives of this course:

1. *To understand the use of electromagnetic fields in the wireless communication.*
2. *To analyze the characteristics of Maxwell's equation in Electric and Magnetic field.*
3. *To understand the use of Transmission Lines and their applications.*

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

1. *Analyse the relation between electric and magnetic fields using vector analysis.*
2. *Evaluate the Maxwell's Equation in Static Electric and Magnetic Field.*
3. *Apply Maxwell's equations in Electromagnetic fields.*
4. *Characterize Maxwell's equation in both static and Time varying fields.*
5. *Understand the propagation of electromagnetic waves in different media.*
6. *Understand the concepts of Transmission lines and Their Applications.*

UNIT – I
Electrostatic Fields: Coulomb's Law and Field Intensity - Electric Fields due to Continuous Charge Distributions – Line Charge, Surface Charge, Volume Charge - Electric Flux Density - Gauss Law – Applications of Gauss Law – Point Charge, Infinite Line Charge, Infinite Sheet Charge, Uniformly Charged Sphere - Electric Potential - Relations Between E and V - Illustrative Problems.

UNIT – II
Magnetostatic Fields: Biot-Savart Law - Ampere's Circuital Law – Applications of Ampere's Circuit Law – Infinite Line Current, Infinite Sheet of Current - Magnetic Flux Density, Maxwell's Equations for Static EM Fields – Magnetic Scalar and Vector Potential - Illustrative Problems.

UNIT – III
Maxwell's Equations (Time Varying Fields): Faraday 's Law - Transformer and Motional EMFs – Stationary Loop in Time Varying B Field, Moving Loop in Static B Field, Moving Loop in Time Varying Field - Displacement Current - Maxwell 's Equations in Different Final Forms, Illustrative Problems.

UNIT – IV
EM Wave Propagation: Waves in General – Wave Propagation in Lossy Dielectrics – Plane Waves in Lossless Dielectrics – Plane Wave in Free Space – Plane Waves in Good Conductors - Power and the Poynting Vector - Reflection of a Plane wave at Normal Incidence - Reflection of a Plane wave at Oblique – Parallel Polarization, Perpendicular Polarization - Illustrative Problems.

UNIT – V

Transmission Lines: Transmission Line Parameters – Transmission Line Equations – Input Impedance, SWR and Power – The Smith Chart – Applications of Transmission Lines – Transients on transmission Lines – Microstrip Transmission Lines – Illustrative Problems.

TEXT BOOKS

1. Matthew N.O. Sadiku, *Elements of Electromagnetics*, Oxford University Press, 3rd edition, 2008.
2. William H. Hayt Jr. and John A. Buck, *Engineering Electromagnetics*, Tata McGraw-Hill publications, 7th edition, 2006.

REFERENCES

1. E.C. Jordan and K.G. Balmain, *Electromagnetic Waves and Radiating Systems*, PHI, 2nd Edition, 2000
2. John D. Krauss, *Electromagnetics*, Tata Mc Graw-Hill publications, 4th edition, 1991.
3. Schaum‘s outline series, *Electromagnetics*, 2nd edition, Tata McGraw-Hill publications, 2006.

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(18EC0413) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

COURSE OBJECTIVES

The objectives of this course:

1. *Explain basic concepts and definitions in measurement.*
2. *Describe the bridge configurations and their applications.*
3. *Elaborate discussion about the importance of signal generators and analyzers in Measurement.*

COURSE OUTCOMES (COs)

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

1. *Recognize the evolution and history of units and standards in Measurements.*
2. *Identify the various parameters that are measurable in electronic instrumentation.*
3. *Employ appropriate instruments to measure given sets of parameters.*
4. *Practice the construction of testing and measuring set up for electronic systems.*
5. *Apply the complete knowledge of various electronics instruments/transducers to measure the physical quantities in the field of science, engineering and technology.*
6. *Relate the usage of various instrumentation standards*

UNIT - I

Performance characteristics of Instruments: Static characteristics- Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration-Errors in Measurement and their statistical analysis, Dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters-DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters – multirange, range extension-Thermocouple type RF ammeter-ohm meters, series type, shunt type-multimeter for voltage, current and resistance measurements.

UNIT - II

Oscilloscopes: Standard specifications of CRO-CRT features-derivation of deflection sensitivity-vertical and horizontal amplifiers-horizontal and vertical deflection systems-sweep trigger pulse- delay line-sync selector circuits, probes for CRO – active, passive, and attenuator type-triggered sweep CRO, and Delayed sweep-dual trace/beam CRO-Measurement of amplitude, frequency and phase (Lissajous method)-Digital storage oscilloscope- Digital frequency counters.

UNIT - III

Signal generators-fixed and variable-AF oscillators-function generators-pulse, random noise, sweep, and arbitrary waveform generators, specifications and principles of working (Block diagram approach)-Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.

UNIT - IV

Review of DC Bridges: Wheatstone bridge,Wein Bridge, errors and precautions in using bridges, **AC bridges:** Measurement of inductance-Maxwell's bridge, Anderson Bridge-Measurement of capacitance- Schearing Bridge.Kelvin Bridge-Q-meter-EMI and EMC.

UNIT - V

Sensors and Transducers - Active and passive transducers-Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) - Temperature (resistance thermometers, thermocouples, and thermistors)-Velocity- Acceleration-Vibration.

TEXT BOOKS

1. H.S.Kalsi, *Electronic instrumentation*, second edition, Tata McGraw Hill, 2004.
2. K. Lal Kishore, *Electronic Measurements & Instrumentations*, Pearson Education, 2009.

REFERENCES

1. A.D. Helfrick and W.D.Cooper, *Modern Electronic Instrumentation and Measurement Techniques*, PHI, 5th Edition, 2002.
2. Ernest O Doebelin and Dhanesh N Manik, *Measurement Systems Application and Design*, TMH, 5th Edition, 2009.
3. Oliver and Cage, *Electronic Measurement and Instrumentation*, TMH.
4. Robert A.Witte, *Electronic Test Instruments, Analog and Digital Measurements*, Pearson Education, 2nd Ed., 2004.
5. David A. Bell, *Electronic Instrumentation & Measurements*, PHI, 2nd Edition, 2003.

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(18EC0414) DIGITAL SIGNAL PROCESSING

(Common to EEE and ECE)

COURSE OBJECTIVES

The objectives of this course:

1. *To perform basic signal processing operations such as Linear Convolution, Circular Convolution, Auto Correlation, Cross Correlation and Frequency analysis in MATLAB.*
2. *To implement FIR and IIR filters in MATLAB and DSP Processor.*
3. *To study the architecture of DSP processor.*
4. *To design a DSP system to demonstrate the Multi-rate signal processing concepts.*

COURSE OUTCOMES (COs)

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

1. *Apply DFT & FFT for the analysis of digital signals and systems and Compare its efficiency.*
2. *Design IIR and FIR filters for the given specifications.*
3. *Construct different forms of IIR and FIR filter realizations.*
4. *Distinguish the effects of finite precision representation on digital filters.*
5. *Evaluate the errors due to Truncation and Rounding in Quantization process.*
6. *Realize DSP architecture and programming.*

UNIT- I

Discrete Fourier Transform(DFT): Discrete Fourier transform–Relationship of the DFT to other transforms, Properties of DFT, Linear filtering based on the DFT- Filtering of long data sequences - overlap save and overlap add method.

Fast Fourier Transform (FFT): Efficient computation of DFT - Radix-2 - Decimation-in-time (DIT), Decimation-in-frequency (DIF) algorithms.

UNIT- II

Infinite Impulse Response Filters: Design of IIR filters from Analog filters - Impulse invariance method, and bilinear transformation. Frequency transformation in the analog domain, Illustrative Problems.

Realization of IIR Filter: Structures for IIR system- Direct-Form, Cascade-Form, and Parallel-Form Structures.

UNIT- III

Finite Impulse Response Filters: Design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method, Illustrative Problems.

Realization of FIR Filter: Structures for FIR system–Direct-Form, Cascade-Formand Linear Phase Structure.

UNIT- IV

Finite Word Length Effects: Representation of Numbers-Fixed point Representation of Numbers and Binary Floating point Representation of Numbers - Quantization –Error due to truncation and rounding –Input Quantization Error–Steady State Input and Output Noise Power - Zero limit cycle oscillations, Dead band.

UNIT- V

Introduction to Digital Signal Processors: Overview of DSP Processors- Architecture of TMS320C50–Bus Structure, Central Processing Unit, On-Chip Memory and On-Chip Peripherals-Applications of Programmable Digital Signal Processors (PDSP).

TEXT BOOKS

1. John G. Proakis& Dimitris G.Manolakis, *Digital Signal Processing – Principles, Algorithms & Applications*, 4th Edition, Pearson Education / Prentice Hall, 2007.

REFERENCES

1. Emmanuel C. Ifeachor& Barrie. W. Jervis,*Digital Signal Processing*, 2nd Edition, Pearson Education / Prentice Hall, 2002.
2. A.V. Oppenheim, R.W. Schafer and J.R. Buck, *Discrete-Time Signal Processing*, 8tth Indian Reprint, Pearson, 2004.
3. Sanjit K. Mitra, *Digital Signal Processing – A Computer Based Approach*, Tata Mc Graw Hill, 2007.
4. Andreas Antoniou, *Digital Signal Processing*, Tata Mc Graw Hill, 2006.
5. P.RameshBabu, *Digital Signal Processing*, SCITECH, 7th Edition, 2019.

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III B.Tech – I Sem.	**L**	**T**	**P**	**C**
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(18EC0415) DIGITAL COMMUNICATIONS

COURSE OBJECTIVES

The objectives of this Course:

1. *To understand the building blocks of digital communication system.*
2. *To Understand and analyze the signal flow in a digital communication system.*
3. *To Analyze error performance of a digital communication system in presence of noise and other interferences.*

COURSE OUTCOMES (COs)

On Successful Completion of this Course the Student will be able to

1. *Understand the Elements of Digital Communication System & Fundamental concepts of sampling Theorem along with different Modulation Techniques.*
2. *Describe and determine the performance of line codes and methods to mitigate inter symbol interference.*
3. *Learn the generation and detection of pass band system.*
4. *Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques.*
5. *Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.*
6. *Apply the knowledge of digital electronics and describe the error control codes like Linear block codes, convolutional codes.*

UNIT – I

Source Coding Systems: Introduction – Elements of digital communication systems – sampling process – quantization – quantization noise – encoding – Differential encoding –Line codes – Pulse Code Modulation (PCM) – Noise considerations in PCM systems –Differential PCM (DPCM)– Delta modulation (DM) – Comparison of the above systems –Illustrative Problems

UNIT – II

Baseband Pulse Transmission: Introduction – Matched filter – Properties of Matched filter – Matched filter for rectangular pulse – Inter-symbol Interference (ISI) – Nyquist's criterion for distortion less baseband binary transmission – Correlative coding – Duo binary & Modified duo binary signaling schemes – Baseband M-array PAM transmission – Eye diagrams – Illustrative Problems

UNIT – III

Signal Space Analysis: Introduction – Geometric representation of signals – Gram-Schmidt Orthogonalization procedure – Conversion of the Continuous AWGN channel into a vector

channel – Correlation receiver – Equivalence of correlation and Matched filter receivers – Signal constellation diagram.

UNIT – IV

Pass band Data Transmission: Introduction – Pass band transmission model – Coherent digital modulation techniques-ASK, BFSK, BPSK and QPSK – Generation and detection of Coherent ASK, BPSK, BFSK– Error probabilities of BPSK, BFSK – M-array PSK – M-array
Quadrature amplitude modulation (M-array QAM) – Non-coherent orthogonal modulation schemes-Differential PSK, Binary FSK – Generation and detection of non-coherent BFSK, DPSK.

UNIT – V

Channel Coding: Introduction – Error Detection & Correction – Parity Check Codes – Code Vectors and Hamming Distance – Forward Error Correction (FEC) Systems – Automatic Retransmission Query (ARQ) Systems. Linear Block Codes–Matrix Representation of Block Codes(encoding) – Syndrome decoding. Convolutional Codes – Convolutional Encoding – Decoding Methods – Illustrative Problems

TEXTBOOKS

1. Simon Haykin, *Communication Systems,* Wiley India Edition, 4th Edition, 2011.

2. B.P. Lathi, &Zhi Ding, *Modern Digital & Analog Communication Systems*, Oxford University Press, International 4th edition, 2010

REFERENCES

1. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2005.

2. Bruce Carlson, & Paul B. Crilly, *Communication Systems – An Introduction to Signals &Noise in Electrical Communication"*, McGraw-Hill International Edition, 5th Edition, 2010

3. Bernard Sklar, *Digital CommunicationS*, Prentice-Hall PTR, 2nd edition, 2001.

4. Sanjay Sharma *Communication Systems*, Kindle Edition.

5. J.G. Proakis, M Salehi, Gerhard Bauch, *Modern Communication Systems Using MATLAB*, CENGAGE, 3rd Edition, 2013.

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(18EC0416) ELECTRONIC MEASUREMENTS LAB

COURSE OBJECTIVES
The objectives of this course:

1. *To know the procedure for measuring Resistance, Capacitance and Inductance of different ranges.*
2. *To perform the experiments to measure temperature, displacement and pressure.*
3. *To know the procedure for measuring voltage, frequency and phase using Oscilloscope.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Assess values of R,L,C ,Voltage, Current, Power, Energy.*
2. *Determine unknown values in balancing Bridges.*
3. *Evaluate frequency, phase in Oscilloscope.*
4. *Explain the use of Digital voltmeters.*
5. *Determine strain, displacement, Velocity, temperature and Pressure.*
6. *Estimate water level using capacitive transducer.*

List of Experiments:

1. Study, operation and technical specification of Multimeter
2. Study, operation and technical specification of thermocouple
3. Study of CRO.
4. Study the temperature & resistance characteristics of RTD
5. Study of water level measurement using capacitive transducer.
6. Measurement of capacitance using Schering's Bridge.
7. Measurement of inductance using Maxwell's Bridge.
8. Measurement of resistance by kelvins bridge **.**
9. Measurement of Strain using Strain Guage.
10. Measurement of displacement using L.V.D.T

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(18EC0417) DIGITAL SIGNAL PROCESSING LAB

COURSE OBJECTIVES
The objectives of this course:

1. *To perform basic signal processing operations such as Linear Convolution, Circular Convolution, Auto Correlation, Cross Correlation and Frequency analysis in MATLAB.*
2. *To implement FIR and IIR filters in MATLAB and DSP Processor.*
3. *To study the architecture of DSP processor.*
4. *To design a DSP system to demonstrate the Multi-rate signal processing concepts.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Analyze basic signal processing operations.*
2. *Perform linear and circular convolution and implement in DSP Processor.*
3. *Compute Auto and Cross Correlation.*
4. *Design the FIR and IIR Filters.*
5. *Analyze the Multirate Signal Processing.*
6. *Implement different elementary Discrete-Time sequences.*

LIST OF EXPERIMENTS
(Minimum of 12 experiments has to be conducted)

Cycle- I (MATLAB based Experiments)

1. Generation of elementary Discrete-Time sequences.
2. Perform linear convolution and Circular convolution.
3. Computation of Auto correlation and Cross Correlation.
4. Computation of DFT and IDFT of given DT signal.
5. Design of Low Pass and High Pass IIR filter.
6. Design of Band Pass and Band Reject IIR filter.
7. Design of Low Pass and High Pass FIR filter.
8. Design of Band Pass and Band Reject FIR filter.
9. Analysis of Decimation Process.
10. Analysis of Interpolation Process.

Cycle- II (Processor Based Experiments)

1. Study the architecture of Digital Signal Processor.
2. Implementation of Linear Convolution of the given sequence.
3. Implementation of Circular Convolution of the given sequence.
4. Implementation of Fast Fourier Transform (FFT).
5. Implementation of different elementary Discrete-Time sequence.

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(18EC0418) DIGITAL COMMUNICATIONS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *This course gives students deep knowledge in digital communication systems at the practical level.*
2. *This lab focuses the fundamental concepts on Pulse modulations, digital modulation techniques, source coding techniques.*

COURSE OUTCOMES (COs)

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

1. *Demonstrate a good background in analyzing the block diagram of communication system*
2. *Able to understand basic theories of Digital communication system in practical*.
3. *The skill to analyze and implement analogue to digital converters like PCM, DM*.
4. *Measures the Amplitude and Frequency of various Base band modulation techniques and observes the output waveforms.*
5. *Measures the Amplitude and Frequency of various Pass band modulation techniques and observes the output waveforms.*
6. *Able to understand channel coding like Linear Block Codes and Convolutional Codes.*

LIST OF EXPERIMENTS (Minimum of Ten experiments to be conducted)

1. Pulse Code Modulation.
2. Differential Pulse Code Modulation.
3. Delta Modulation.
4. Amplitude Shift Keying
5. Frequency Shift Keying.
6. Phase Shift Keying.
7. Differential Phase Shift Keying.
8. Quadrature Amplitude Modulation
9. QPSK Modulation and Demodulation.
10. Eye Diagrams
11. Linear Block Codes- Encoder and Decoder
12. Convolutional Codes- Encoder and Decoder

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CROs - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Multimeters
5. Experimental kits
6. Required Electronic components (Active and Passive) which include IC’s

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(18HS0859) ENGLISH FOR CORPORATE COMMUNICATION SKILLS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To improve the students' fluency in English, through a well-developed vocabulary*
2. *To enable them listening spoken English at normal conversational speed by English speakers*
3. *To respond appropriately in different social-cultural and professional contexts*
4. *To develop drafting skills among the students.*
5. *To develop Inter-personal and Intra-personal Skills*

COURSE OUTCOMES (COs)

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

1. *Flair in Writing by using cohesion and coherence.*
2. *To prepare effective job application.*
3. *Presenting Effective Speaking Abilities.*
4. *To apply various communicative techniques in their professional lives.*
5. *To cope with the employability skills.*
6. *Use effective communicative approaches by preparing job application, report and other kinds of spoken and written correspondences.*

UNIT- I

COMMUNICATIVE COMPETENCY

1. Reading Comprehension
2. Listening Comprehension
3. Vocabulary for competitive purpose
4. Spotting Errors

UNIT- II

TECHNICAL WRITING

1. Report writing
2. Curriculum vitae
3. Cover Letter
4. E-mail writing

UNIT- III

PRESENTATIONAL SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation
4. Stage Dynamics

UNIT- IV

CORPORATE SKILLS

1. Dress code
2. Telephonic skills
3. Net-etiquettes

UNIT- V

GETTING READY FOR JOB

1. Group Discussion
2. Interview skills
3. Psychometric test

Minimum requirements for English for Corporate Communication Skills Lab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.

2. English for Corporate Communication Skills Lab with movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.

System Requirement (Hardware component):

Computer network, LAN with minimum 60 multimedia systems with the following:

Specifications

i) a) Intel (R) core (TM) i3
   b) Speed 3.10 GHZ
   c) RAM – 4 GB
   d) Hard Disk – 320 GB

ii) Headphones with High quality

Software

Walden Info Tech Software

References

1. Effective Tech Communication, Rizvi, Tata McGraw – Hill Education, 2007.
2. Communication skills, Sanjay Kumar &Pushpalatha, Oxford University Press, 2012.
3. Writing Tutor. Advanced English Learners' Dictionary, 9th Edition, Oxford University Press, 2015.
4. Powerful Vocabulary Builder, Anjana Agarwal, New Age International Publishers, 2011.
5. Listening Extra, Miles Craven, Cambridge University Press, 2008.

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(18EC0451) DATA COMMUNICATION AND NETWORKING

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basic concepts of data communication, layered model, protocols and inter-working between computer networks and switching components in telecommunication systems.*
2. *Discuss the nature, uses and implications of internet technology.*
3. *To understand the functioning of Frame Relay, ATM.*
4. *An overview of security issues related to data communication in networks.*

COURSE OUTCOMES (COs)

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

1. *Understand the basics of data communication, networking, internet and their importance.*
2. *Analyze the services and features of various protocol layers in data networks.*
3. *Differentiate wired and wireless computer networks*
4. *Analyze TCP/IP and their protocols.*
5. *Recognize the different internet devices and their functions*
6. *Identify the basic security threats of a network.*

UNIT – I

Introduction to data communication and networks

Data communication-data representation, data flow, components. Definition of node, link, branch, network, network criteria. **Physical structures**-types of connection, working of different network topologies, network configuration and their advantages, concepts and comparison of LAN, MAN, WAN. Switching - concepts of circuit switching, packet switching & message switching and their applications.

Networking protocols and OSI model

Protocol layering-Scenarios, principles. Logical connection-connection oriented and connection less. Protocols in computer communications, **OSI reference model** - functions of all layers. **Data link control**- concept of framing, flow control and error control.**MAC protocol**- addressing mechanism. Concept of encapsulation and decapsulation.

UNIT – II

Computer Networks

Local area network-wired LANs features and classification. **Ethernet**- properties, frame format (IEEE 802.3), addressing, simple problems on addressing .**virtual LAN**- working, advantages. **Access method**–CSMA/CD. **Token passing LANS**- properties, token bus maintenance and working. Token ring properties, mechanism. **FDDI** –operation, self healing, **Wireless LANS** - features, Bluetooth architecture (IEEE 802.15). Basic concepts of WIMAX, cellular telephony, satellite networks.

UNIT – III

TCP/IP: TCP/IP-Model, protocols layers, INTERNET Address, logical address, Physical address, UDP/IP Datagram Format, classes of IP address, Dotted Decimal notation of IP address, basics of IPv4 and IPv6,simple problems on addressing. **Address mapping** –static mapping, dynamic mapping**. ARP**-need, methods, need of RARP and ICMP. Definition of fragmentation and reassembly. Features of TCP, relationship between TCP and IP.

UNIT – IV

Communication protocols: Concepts of Ports and Sockets. **Domain Name System (DNS) -**name system, name space, working of DNS server. **Email**- architecture, protocols, advantages of IMAP. Basics of FTP, **FTP Connections** - Control and Data transfer Connection**. Frame relay**- Need, Working of frame relay, **ATM**- Architecture, characteristics.

UNIT – V

Internet devices and protocols: Internetworking-need and concept. Connecting Devices-discussion on Routers, switches, repeaters, Bridges, Switches and Gateways. Ways of accessing the internet- Dial-up access, SLIP, PPP, leased lines, DSL basics, internet access by cable. Modems-basics, types, operation, applications. Network security-basics of threats and fire wall.

TEXT BOOKS

1. *Data Communications and Networks*- 2nd edition -Achyut S Godbole- and Atul Kahate Tata McGraw-*Hill.*
2. *Data Communications & Networking* – 5th Edition- B A Forouzan- Tata McGraw-Hill.
3. *Computer Networks*- 4th Edition- Andrew S Tanenbaum- Pearson-Prentice Hall.
4. *Computer Networking* - James F. Kurose & Keith W. Ross- PEARSON.

REFERENCES

1. *Data and Computer Communications*- Eighth Edition- William Stallings- Pearson Education.
2. Refer the course contents at NPTEL website of IIT Khargapur of course- Communication Networks and Switching.
3. *Network Security Bible*, 2nd edition, Eric Cole, Wiley Publishers.
4. *Data communication and networks* –James Irvine and David Harley- Publishers: Wiley India.

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(18EC0419) ANTENNAS AND WAVE PROPAGATION

COURSE OBJECTIVES

The objectives of this course:

1. *To learn the Fundamentals of electromagnetic: radiation, wave equation, retarded potential, short current element, near and far fields, Poynting's theorem.*
2. *To Design of antenna arrays: principle of pattern multiplication.*
3. *To understand broadside and end fire arrays, array synthesis, coupling effects and mutual impedance, parasitic elements, Yagi-Uda antenna.*

COURSE OUTCOMES (COs)

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

1. *Understand the basic principles of all types of antennas calculate the far field region.*
2. *Analyze different types of antennas their parametric integral expressions for a given current source for various frequency ranges.*
3. *Calculate electromagnetic fields for a given vector potential can understand practical antennas.*
4. *Implement pattern multiplication principle for some practical array antennas such as dipole, Yagi - uda, and horn antenna.*
5. *Apply the radiation patterns of antennas through measurement setups.*
6. *Learn various modes of wave propagation and their parameters*

UNIT – I

Antenna & Radiation Parameters: Antenna Basics & Parameters – Radiation Pattern, Radiation Intensity, Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam Efficiency. Matching , Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole and Quarter wave monopole and its radiation parameters.

UNIT- II

VHF, UHF and Microwave Antennas –I: Folded Dipoles, Arrays with Parasitic Elements – Yagi-Uda Arrays. Helical Antennas, and its modes, Normal Mode, Axial Mode. Horn Antennas – Types, Optimum Horns- Design considerations of Pyramidal Horns, Illustrative Problems.

UNIT – III

VHF, UHF and Microwave Antennas – II & Antenna Measurements: Micro strip Antennas – Introduction, features, advantages and limitations, Rectangular patch antennas –Geometry, characteristics of Micro strip antennas, Introduction to Reflector Antenna, parabola reflectors, pattern characteristics, Feed Methods

Antenna Measurements – Introduction, Concepts – Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement , Gain Measurements (by comparison, Absolute).

UNIT- IV

Antenna Arrays: Point sources - Definition, Patterns, arrays of 2 Isotropic sources – Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison of BSA & EFA, Binomial Arrays, Illustrative problems.

UNIT – V

Wave Propagation: Different modes of wave propagation, Structure of Ground wave propagation, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Illustrative problems.

TEXT BOOKS

1. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, "*Antennas and wave propagatio*n," TMH, New Delhi, 4th Ed., (special Indian Edition), 2010.
2. C.A. Balanis, "*Antenna Theory- Analysis and Design*," John Wiley & Sons, 2nd Edn. 2001.

REFERENCES

1. K.D. Prasad, Satya Prakashan, "*Antennas and Wave Propagation,*" 4th Ed.,Tech. India Publications, New Delhi, 2001.
2. E.C. Jordan and K.G. Balmain, "*Electromagnetic Waves and Radiating Systems,*" PHI, 2nd Edn, 2000.
3. E.V.D. Glazier and H.R.L. Lamont,"*Transmission and Propagation - The Services Text Book of Radio*",‖ vol. 5, Standard Publishers Distributors, Delhi.
4. F.E. Terman, "*Electronic and Radio Engineering*",‖ McGraw-Hill, 4th edition, 1955.

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(18EC0420) MICROPROCESSORS AND MICROCONTROLLERS

(Common to EEE and ECE)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basic architecture of computer, evolution, and its applications*
2. *To learn the architectures of Microprocessor and Microcontroller*
3. *To learn the programming of Microprocessors and Microcontrollers using their programming model*
4. *To learn the interfacing of memory, I/O, sensors and actuators to microprocessors and microcontrollers*

COURSE OUTCOMES (COs)

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

1. *Understand the evolution of computers, processors, and its applications*
2. *Explain the various software and hardware parts of a microprocessors and computer*
3. *Understand the architectures of 8085 microprocessor and 8051 microcontroller system*
4. *Analyze the programming model of 8085 Microprocessor & 8051 microcontroller development environment.*
5. *Implement the techniques of interfacing memories, various I/O devices, sensors and actuators with microprocessor and microcontrollers*
6. *Design and develop various microprocessor/microcontroller-based systems for the real-life problems*

UNIT – I

Microprocessors, Microcomputers and Assembly Language: Microprocessors – Microprocessor instruction set and computer languages – From large computers to single chip microcontrollers – Application: Microprocessor controlled temperature system (MCTS)

Microprocessor Architecture and Microcomputer Systems: Microprocessor Architecture and its operation – Memory – Input and output devices – Example of a microcomputer system

UNIT – II

8085 Microprocessor Architecture: The 8085 MPU - The 8085 Microprocessor, Microprocessor communication and bus timings, Demultiplexing the bus AD7-AD0, Generating control signals and A detailed look at the 8085 MPU and its architecture– Instruction, Data format and Data Storage – Overview of the 8085 Instruction set .

UNIT – III

The 8051 Architecture: Introduction – 8051 microcontroller hardware – Input/output pins, ports and circuits – External memory – Counters and timers – Serial data input/output - Interrupts

UNIT – IV

Programming the 8051: Addressing modes - Moving data – Logical operations – Arithmetic operations – Jump and call instructions

UNIT – V

Applications: Introduction – Keyboards – Displays – D/A and A/D Conversion - Multiple interrupts

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, *Computer Organization,* McGraw Hill Eductaion Pvt. Ltd, 5th Edition, 2017.
2. Ramesh Gaonkar, *Microprocessor Architecture, programming and applications with the 8085,* Penram International Publications Pvt Ltd. 6th Edition, 2015.
3. Kenneth J Ayala, *The 8051 microcontroller,* Penram International Publications Pvt Ltd, 2nd Edition, 1997,

REFERENCES

1. Ray Bhurchandi, *Advanced Microprocessors & Peripheral interfacing*, MC graw hill Publications, 3rd edition, 2012.
2. N.Senthil Kumar, M.Saravanan, S.Jeevanathan, *Microprocessor and Microcontrollers*, Oxford Publishers. 1st Edition, 2015.

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(18EC0428) MICROWAVE THEORY AND TECHNIQUES

(Professional Elective – I)

COURSE OBJECTIVES

The objectives of this course:

1. *To develop the knowledge on transmission lines for microwaves, cavity resonators and wave guide components and applications*
2. *To understand the scattering matrix parameters and its use*
3. *To understand the microwave tubes and microwave test bench for measure different parameters like attenuation, VSWR, etc.,*

COURSE OUTCOMES (COs)

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

1. *Design and simulate waveguide components for various applications*
2. *Compare between the conventional waveguides & microwave tubes*
3. *Able to analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices*
4. *Utilize knowledge about the measurements to be done at microwaves*
5. *Able to illustrate the various parameters and explain about the characteristics of the various waveguide components*
6. *Able to define the basic concepts of microwave tubes & Scattering Matrix*

UNIT- I

Introduction of Microwave: Introduction to Microwaves - History of Microwaves, Microwave Frequency bands, Applications of Microwaves. Mathematical Model of Microwave Transmission - Concept of Mode, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations. Power Transmission and Power Losses in Rectangular Guide - Features of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission.

UNIT- II

Microwave Parameters: Analysis of RF and Microwave Transmission Lines - Coaxial line, Rectangular waveguide, Circular waveguide, Strip line, Micro strip line. Microwave Network Analysis - Equivalent voltages and currents for non-TEM lines, Ferrite Components – Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems.

UNIT- III

Waveguide Components and Applications: Coupling Mechanisms–Probe, Loop, Aperture types. Waveguide Discontinuities - Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types. Waveguide Phase Shifters - Rotary Vane types.

Scattering Matrix– Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E- plane and H-plane Tees, Magic Tee, Hybrid Ring. Directional Couplers –2Hole, Bethe Hole types.

UNIT- IV

Microwave Tubes: Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. O-type tubes: 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency.

M-Type Tubes: Introduction, Cross-field effects. Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave. Magnetron – Hull Cut-off and Hartree Conditions.

UNIT- V

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Precautions. Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.

TEXT BOOKS

1. Samuel Y. Liao, *Microwave Devices and Circuits*, PHI, 3rd Edition,1994.
2. Herbert J. Reich, J.G. Skalnik, P.F. Ordungand H.L. Krauss, *Microwave Principles*, CBS Publishers and Distributors, New Delhi, 2004.

REFERENCES

1. R.E. Collin, *Foundations for Microwave Engineering*, IEEE Press, John Wiley, 2nd Edition,2002.
2. M.L. Sisodia and G.S.Raghuvanshi, *Microwave Circuits and Passive Devices*, Wiley Eastern Ltd., New Age International Publishers Ltd.,1995.
3. Peter A. Rizzi, *Microwave Engineering Passive Circuits*, PHI,1999.
4. F.E. Terman, *Electronic and Radio Engineering*, McGraw-Hill, 4th Edition, 1955.

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(18EC0429) INFORMATION THEORY AND CODING

(Professional Elective – I)

COURSE OBJECTIVES
The objectives of this course:

1. *To introduce the principles and applications of information theory.*
2. *To guide the student through the implications and consequences of fundamental theories and laws of information theory and coding theory with reference to the application in modern communication and computer systems.*
3. *To teach coding schemes, including error correcting codes.*
4. *To explain how this quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problems.*

COURSE OUTCOMES (COs)
After the completion of the course, student will be able to

1. *Explain the concept of information.*
2. *Analyse the concept of entropy and error control coding .*
3. *Determine channel capacity.*
4. *Apply coding techniques to define channel capacities and properties using Shannon's Theorems.*
5. *Construct efficient codes for data on imperfect communication channels.*
6. *Analyse error correction and detection in receiver section.*

UNIT - I
Information Theory: Introduction-Measure of information-Information content of message - Average Information content of symbols in Long Independent sequences-Average Information content of symbols in Long dependent sequences.

UNIT - II
Source Coding: Source coding theorem - Prefix Codes -Kraft McMillan Inequality property Encoding of the Source Output - Shannon's Encoding Algorithm - Shannon Fano Encoding Algorithm - Huffman codes, Extended Huffman coding.

UNIT - III
Information Channels: Communication Channels-Channel Models-Channel Matrix-Joint probability Matrix, Binary Symmetric Channel, System Entropies, Mutual Information, Channel Capacity, Channel Capacity of Binary Symmetric Channel.

UNIT - IV

Error Control Coding: Introduction-Examples of Error control coding-methods of Controlling Errors-Types of Errors-Types of Codes-Linear Block Codes: Matrix description of Linear Block Codes-Error Detection and Error Correction Capabilities of Linear Block Codes-Single Error Correcting Hamming Codes.

UNIT - V

Binary Cyclic Codes: Algebraic Structure of Cyclic Codes-Encoding using an (n-k) Bit Shift register-Syndrome Calculation-Error Detection and Correction.

Convolution Codes: Convolution Encoder-Time domain approach-Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm.

TEXT BOOKS

1. Murlidhar Kulkarni, *Information Theory And Coding*, Wiley India, 1st Edition, 2018.
2. Shu Lin and D.J. Costello Jr., *Error Control Coding*, Prentice Hall, 2nd Edition, 1983.

REFERENCES

1. M. Mansurpur, *Introduction to Information Theory*, McGraw Hill, 1987.
2. N. Abramson, *Information and Coding*, 1st Edition, McGraw Hill, 1963.
3. R.B. Ash, *Information Theory*, Prentice Hall, 1970.

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(18EC0430) SCIENTIFIC COMPUTING

(Professional Elective – I)

COURSE OBJECTIVES
The objectives of this course:

1. *To introduce the basic concepts of solving algebraic and transcendental equations*
2. *To introduce the numerical techniques of interpolation in various intervals in real life situations.*
3. *To acquaint the student with understanding of numerical techniques of differentiation and integration this plays an important role in engineering and technology disciplines.*
4. *To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.*
5. *To understand the knowledge of various techniques and methods of solving various types of partial differential equations*.

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Illustrate the significance of computing methods, their strengths and application areas.*
2. *Solve the scientific computing of system of linear equations and Eigen values and singular values in real life situations.*
3. *Apply the scientific computing of system of Non - linear equations and Interpolation for engineering problems.*
4. *Demonstrate the knowledge of scientific methods for solving Numerical Integration and Differentiation for engineering problems.*
5. *Solve the ordinary differential equations with initial conditions by using scientific techniques with engineering applications.*
6. *Evaluate the partial differential equations by using scientific techniques with engineering applications.*

UNIT - I
Introduction: Sources of Approximations, Data Error and Computational, Truncation Error and Rounding Error, Absolute Error and Relative Error, Sensitivity and Conditioning, Backward Error Analysis, Stability and Accuracy.
Computer Arithmetic: Floating Point Numbers, Normalization, Properties of Floating Point System, Rounding, Machine Precision, Subnormal and Gradual Underflow, Exceptional Values, Floating-Point Arithmetic, Cancellation

UNIT - II

System Of Linear Equations: Linear Systems, Solving Linear Systems, Gaussian elimination, Pivoting, Gauss-Jordan, Norms and Condition Numbers, Symmetric Positive Definite Systems and Indefinite System, Iterative Methods for Linear Systems.

Eigenvalues And Singular Values: Eigenvalues and Eigenvectors, Methods for Computing All Eigenvalues, Jacobi Method, Methods for Computing Selected Eigenvalues, Singular Values Decomposition, Application of SVD.

UNIT - III

Nonlinear Equations: Fixed Point Iteration, Newton's Method, Inverse Interpolation Method Optimization: One-Dimensional Optimization, Multidimensional Unconstrained Optimization, Nonlinear Least Squares.

Interpolation: Purpose for Interpolation, Choice of Interpolating, Function, Polynomial Interpolation, Piecewise Polynomial Interpolation.

UNIT - IV

Numerical Integration and Differentiation: Quadrature Rule, Newton-Cotes Rule, Gaussian Quadrature Rule, Finite Difference Approximation.

Initial Value Problems For ODEs: Euler's Method, Taylor Series Method, Runga-Kutta Method, Extrapolation Methods, Boundary Value Problems for ODES, Finite Difference Methods, Finite Element Method, Eigenvalue Problems.

UNIT - V

Partial Differential Equations: Time Dependent Problems, Time Independent Problems, Solution for Sparse Linear Systems, Iterative Methods.

TEXT BOOKS

1. Heath Michael T.,*Scientific Computing: An Introductory Survey*, McGraw-Hill, 2nd Ed., 2002.
2. Press William H., Saul A. Teukolsky, Vetterling William T and Brian P. Flannery, *Numerical Recipes: The Art of Scientific Computing*, Cambridge University Press, 3rd Ed., 2007.

REFERENCES

1. Xin-she Yang (Ed.).,*Introduction To Computational Mathematics*, World Scientific Publishing Co., 2nd Ed., 2008.
2. Kiryanov D. and KiryanovaE.,*Computational Science*, Infinity Science Press, 1st Ed., 2006.
3. Quarteroni, Alfio, Saleri, Fausto, Gervasio and Paola,*Scientific Computing With MATLAB and Octave*, Springer, 3rd Ed., 2010.

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(18CE0127) ELEMENTS OF ROAD TRAFFIC SAFETY
(Open Elective-I)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the accident statistics globally and in India specifically, its causes and measures to overcome the situation.*
2. *The traffic regulation, parking problems, understanding of road signs, signals and marking are also taught; so that the student is well informed about all safety measures that a traffic engineer need to understand.*
3. *To understand the various aspects of street lighting.*

COURSE OUTCOMES (COs)

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

1. *Identify the causes for road accidents and can implement measures to prevent road accidents*
2. *Describe traffic regulations and implement parking methods*
3. *Classify different traffic signal and can design traffic signal system*
4. *List and illustrate various traffic signs*
5. *List and discuss various road markings*
6. *Discuss importance of street lighting and classify various street lighting system*

UNIT – I

Road Accidents – Causes & Prevention: Road Accidents & Traffic Engineering – Accident Situation in India – International Comparison of Road Accidents – Road & its Effects on Accidents – The Vehicle – The Driven – Skidding – Speed in Relation of Safety – Weather & its Effects on Accidents – Pedestrian Safety -Cyclists – Motor Cycle & Scooter Rider – Parking & Its Influence on Accident – Legislation, Enforcement, Education & Propaganda – Cost of Road Accidents.

UNIT – II

Regulations of Traffic: Basic Principals of Regulation – Regulation of Speed – Regulation of Vehicles – Regulations Concerning the Driver – Regulations Concerning Traffic – Parking Regulations – Enforcement of Regulations.

Parking: Traffic& Parking Problems – Ill-Effects of Parking – Zoning & Parking Space Requirement Standards – Design Standards for On-Street Parking Facilities – Traffic Regulatory Measures for On-Street Parking – Off-Street Parking Facilities – Peripheral Parking Schemes – Loading & Unloading Facilities – Truck Terminals – Long Distance Bus Terminals.

UNIT – III

Traffic Signs: Importance of Traffic Signs – Need for International Standardization – The Situation in India – General Principals of Traffic Signing – Types of Traffic Signs – Danger Signs (Warning Signs or Cautionary Signs) – Prohibitory Signs – Mandatory Signs – Informatory Sings – Indication Signs – Direction Signs, Advance Direction Signs & Place Identification Signs – Overhead Sings – Route Marker Sings – Location, Height & Maintenance of Traffic Sings.

UNIT – IV

Traffic Signals: Advantages & Disadvantages of Traffic Signals – Signal Indications – Signal Face – Illustration of the Signals – Number & Location of Signals Faces – Amber Period, Red/Amber Period & Inter Green Period – Fixed Time Signals & Vehicle Actuated Signals – Determination of Optimum Cycle Length & Signal Settings for an Intersection with Fixed Time Signals – Warrants for Signals – Co-ordinated Control of Signals – Signal Approach Dimensions – Area Traffic Control – Delay at Signalized Intersection.

UNIT – V

Road Markings: Function – Types of Road Marking – General Principals of Longitudinal Pavement Markings – Material & Color – Centre Lines – Traffic Lane Lines – No Overtaking Zone Markings – Pavement Edge Lines – Carriageway Width Reduction Transition Marking – Obstruction Approach Markings – S
top Lines – Pedestrian Crossings – Cyclist Crossings – Route Direction Arrows – Word Messages – Markings at Approaches to Intersections – Parking Space Limits – Object Markings.

Street Lighting: Need for Street Lighting – Definition of Common Terms – Some Laws of Illumination – Mounting Height – Spacing – Lantern Arrangements – Type of Lamps – Lamp Installation of T' Junctions & Cross Roads – Illumination of Traffic Rotaries – Lighting of Bends – Lighting of Dual Carriageways – Lighting of Roads Carrying Only Local Traffic – Lighting Bridges – Tunnel Lighting – Maintenance of Lighting Installation.

TEXT BOOKS

1. L.R.Kadiyali and Lal, *Traffic Engineering and Transportation Planning*, Khanna Publications, 9th edition, 1999.
2. S.K.Khanna & C.E.G.Justo, *Highway Engineering*, Published by Nemchand & Bros,10th edition, 2012.

REFERENCES

1. L.R.Kadiyali and Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications, 7th edition, 2013.
2. R.Srinivasa Kumar, *Text book of Highway Engineering*, Universities Press.
3. James H Banks, *Introduction to Transportation Engineering*, Tata McGraw hill Publications, 2nd edition.

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(18EE0234) INDUSTRIAL INSTRUMENTATION

(Open Elective-I)

COURSE OBJECTIVES
The objectives of this course are:

1. *To Analyse the Common errors that occur in measurement systems, and their classification.*
2. *To understand the characteristics of signals, their representation, and signal modulation techniques.*
3. *To learn the Methods of Data Transmission, Telemetry, and Data acquisition.*
4. *To study working principles of different Signal Analyzers and Digital meters.*
5. *To learn about several types of transducers and their use for measurement of non-electrical quantities.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Identify and explain the types of errors occuring in measurement systems.*
2. *Differentiate among the types of data transmission and modulation techniques.*
3. *Apply digital techniques to measure voltage, frequency and speed.*
4. *Analyse the working principles of different Signal Analyzers and Digital meters.*
5. *Understand the operation of several types of transducers.*
6. *Choose suitable Transducers for the measurement of non-electrical quantities.*

UNIT-I

Characteristics of Signals and their Representation: Measuring Systems, Performance Characteristics, Static Characteristics, Dynamic Characteristics, Errors in Measurement Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signals and their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II

Data Transmission, Telemetry and DAS: Methods of Data Transmission–General Telemetry System. Frequency Modulation (FM), Pulse Modulation (PM),Pulse Amplitude Modulation(PAM), Pulse Code modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Data Acquisition Systems–Components of Analog DAS–Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing–Digital DAS–Block Diagram—Modern Digital DAS (Block Diagram).

UNIT-III

Signal Analyzers, Digital Meters: Wave Analysers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers-Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, QMeter. Peak Reading and RMS Voltmeters, Digital Voltmeters-Successive Approximation, Ramp and Integrating Type-Digital Frequency Meter-Digital Multimeter-Digital Tachometer

UNIT-IV

Transducers: Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers, Principle of Operation of Resistive, Inductive, Capacitive Transducers, LVDT, Strain Gauge and its Principle of Operation,GaugeFactor,Thermistors,Thermocouples,Synchros,PiezoelectricTransducers,Photovoltaic,Photo Conductive Cells, Photo Diodes.

UNIT-V

Measurement of Non-Electrical Quantities: Measurement of strain, Gauge Sensitivity, Measurement of Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXT BOOKS

1. A.K.Sawhney, Dhanpat Rai & Co, *A course in Electrical and Electronic Measurements and Instrumentation*, 2012.
2. D.V.S. Murty, *Transducers and Instrumentation,* Prentice Hall of India,2nd Edition, 2004.

REFERENCES

1. A.Dhelfrick and W.D.Cooper, *Modern Electronic Instrumentation and Measurement Technique,* Pearson/Prentice Hall of India, 1990.
2. H.S.Kalsi, *Electronic Instrumentation,* Tata Mc Graw-Hill Education, 2010.
3. T.R.Padmanabhan, *Industrial Instrumentation – Principles and Design,* Springer.

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(18ME0307) NON-CONVENTIONAL ENERGY RESOURCES

(Open Elective-I)

COURSE OBJECTIVES

To make the students understand

1. *The importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Solar energy, its harnessing technologies, types of solar collectors, measuring devices. & its applications*
3. *Method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation*
4. *The concept of bio energy and its conversion devices*
5. *Different renewable energies such as tidal energy, geothermal energy, fuel cells etc.*

COURSE OUTCOMES (COs)

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

1. *State various sources of Energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the Wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the Biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC, Fuel cell, etc. for effective construction of Hybrid systems.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies.*

UNIT-I

Introduction -world energy use – classification of energy's-reserves of energy resources– environmental aspects of energy utilization – need of renewable energy– renewable Energy scenario in Andhra Pradesh, India and around the world.

UNIT-II

Solar thermal conversion - Flat Plate and Concentrating Collectors – Solar direct Thermal Applications– Solar thermal Power Generation

Photo voltaic Conversion: Fundamentals of Solar Photo Voltaic Conversion – Solar Cells –Solar PV Power Generation – Solar PV Applications, Solar Radiation Measurements

UNIT-III

Wind Energy - Types of Wind Energy Systems – Performance – Site Selection – Details of Wind Turbine–Wind Energy Measurements-Safety and Environmental Aspects

UNIT-IV

Bio Energy- Biomass direct combustion – Biomass gasifiers – Biogas plants–Ethanol production – Biodiesel – Cogeneration - Biomass Applications

UNIT-V

Other Sources of Energy - Tidal energy – Wave Energy – Open and Closed OTEC Cycles – Geothermal Energy – Hydrogen and Storage - Fuel Cell Systems – Hybrid Systems.

TEXT BOOKS

1. R.K. Rajput, *Non-conventional Energy Sources and Utilization*, S. Chand Publishers, 2nd Edition, 2014.
2. G. D Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 1st Edition, 2010.
3. Nicholas Jenkins & Janaka Ekanayake, *Renewable Energy Engineering*, Cambridge University Press; 1st Edition, 2017.

REFERENCES

1. Dr. R K Singal, *Non-Conventional Energy Resources*, S.K Kataria & Sons, 4th Edition, 2014.
2. John Twidell & Tony Weir, *Renewable Energy Sources*, Routledge publisher, 3rd Edition, 2015.
3. Sukhatme. S.P, *Solar Energy, Principles of Thermal Collection and Storage*,Tata Mc Graw Hill Publishing Company Limited, 6th Edition, 1990.

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(18CS0517) PYTHON PROGRAMMING

(Open Elective – I)

COURSE OBJECTIVES
The objectives of this course:

1. *Introduce Scripting Language*
2. *Exposure to various problem solving approaches of computer science*
3. *Introduce function-oriented programming paradigm*
4. *Exposure to solve the problems using object oriented concepts, exceptional handling*
5. *Exposure to solve the problems using Files, Regular Expressions and, Standard Libraries*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Solve the problems using control structures, input and output statements.*
2. *Summarize the features of lists, tuples, dictionaries, strings and files*
3. *Experience the usage of standard libraries, objects, and modules*
4. *Solve the problems using Object Oriented Programming Concepts*
5. *Build the software for real time applications using python*
6. *Install various Python packages*

UNIT – I
Introduction: History of Python-Python features- Applications-Programming Using the REPL - Running Python Scripts-Variables – Assignment- Keywords- Input-Output- Indentation.
Data Types: Single-Value data types - int, float, complex and boolean.
Multi-Valued Data types - Lists, Tuples, Sets, Dictionaries ,Strings- indexing and slicing.

UNIT – II
Operators and Expressions: Operators-Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators- Expressions and order of evaluations
Control Flow: Branching- simple if, if-else, if-elif-else, nested if, looping-while and for- jumping – break- continue and pass.

UNIT – III
Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions- Nested functions, Recursive functions- Scope of the Variables in a Function.

Object Oriented Programming in Python: Classes and Objects- self-variable- Methods – Constructor- Inheritance-polymorphism- Method Overloading- Method Overriding.

UNIT – IV

Modules: Creating modules, import statement, from...import statement and name spacing.

Python packages: Introduction to PIP- Installing Packages via PIP (Numpy, Pandas, MatPlotlib etc.,)- Using Python Packages.

Exception Handling: Introduction to Errors and Exceptions, Handing Exceptions, Raising Exceptions, User Defined Exceptions, Regular Expressions-Searching and Matching.

UNIT – V

Functional Programming: Iterators and Generators - Maps and Filters.

Files: Text files- Reading and Writing files- Command line arguments.

Brief Tour of the Standard Library: Dates and Times- Data Compression- Python Runtime Services- Data Management and Object Persistence.

GUI Programming - Turtle Graphics

TEXT BOOKS

1. Reema Thareja, *Python Programming: Using Problem Solving Approach*, First Edition, Oxford University Press.
2. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson education.

REFERENCES

1. Mark Lutz , *Learning Python*, O Reily, 4th Edition, 2009.
2. Mark Lutz , *Programming Python* , O Reily, 4th Edition, 2010.
3. Tim Hall and J-P Stacey , *Python 3 for Absolute Beginners*, 2009.
4. Magnus Lie Hetland , *Beginning Python: From Novice to Professional*, 2nd Edition, 2009.
5. Michael T. Goodrich , Roberto Tamassia, Michael H. Goldwasser, *Data Structures and Algorithms in Python,*1st Edition , Kindle.

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(18HS0814) INTELLECTUAL PROPERTY RIGHTS

(Open Elective-I)

COURSE OBJECTIVES
The objectives of this course:

1. *To provide an understanding of the concept and significance of intellectual property rights*
2. *To understand the concept of trademarks, copy rights, patents and the need for their protection*
3. *To comprehend the concept of competition, unfair competition and the latest developments in the laws pertaining to intellectual property rights*

COURSE OUTCOMES (COs)
On successful completion of the course, students will be able to:

1. *Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights*
2. *Identify different types of intellectual properties, ownership rights and the scope of the protection*
3. *Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work*
4. *Able to identify, apply, and assess ownership rights, registration processes for IP rights*
5. *To discern the approaches for intellectual property management and intellectual property audits*
6. *Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level*

UNIT – I
Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II
Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III
Law of Copy Rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of Patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair Competition: Misappropriation right of publicity, False advertising.

UNIT – V

New Development Of Intellectual Property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS

1. Deborah, E. Bouchoux, *Intellectual property right*, cengage learning
2. Nityananda KV, *Intellectual property rights: Protection and Management.* India, Cengage Learning India Private Limited.

REFERENCES

1. Prabuddhaganguli, *Intellectual property right - Unleashing the knowledge economy*,Tata McGraw Hill Publishing Company Ltd.
2. Ahuja VK IN,*Law relating to Intellectual Property rights.* India.: Lexis Nexis
3. Neeraj P & Khushdeep D, *Intellectual Property Rights*, India PHI learning pvt limited.

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(18EC0421) ANTENNAS AND WAVE PROPAGATION LAB (Virtual Lab)

COURSE OBJECTIVES

The objectives of this course:

1. *To learn an antenna model with different parameters, associated with the specific antenna learns various wire antennas, dipole , loop, helix … etc.*
2. *To understand arrays and the different parameters that control the shape of the radiation pattern*
3. *To design and plot graphs using software programs.*

COURSE OUTCOMES

On successful completion of the course, students will be able to

1. *Understand parametric equations for the calculation in the far field region.*
2. *Analyze Antenna model for various VHF, UHF.*
3. *Learn pattern multiplication principle for array antennas.*
4. *Understand the relation between various antennas and their parameters .*
5. *Calculate Microwave Antennas parameters.*
6. *Applications of the various practical antenna.*

BASIC ANTENNA WORKSHOP PRACTICE (in 3 lab sessions)

1. Basic antenna parameters – patterns, Beam Area, Radiation Intensity, Directivity, Gain, Polarization – Linear, Elliptical, & Circular polarizations, Antenna temperature, Antenna impedance, Front–to-back ratio.
2. Loop Antennas, Micro strip Antennas, Lens Antennas.

LIST OF EXPERIMENTS

(For Laboratory examination – Minimum of 5 experiments)

1) To study and plot the radiation pattern of simple dipole antenna.
2) To study and plot the radiation pattern of Half Wave dipole antenna.
3) To study and plot the radiation pattern of folded dipole antenna
4) To study and plot the radiation pattern of 4 Element YagiUda antenna.
5) To study and plot the radiation pattern of helical antenna.
6) To study various types of parabolic reflectors and their feed systems.
7) To study and plot the radiation pattern of broad side antenna array.

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(18EC0422) MICROCONTROLLER AND APPLICATIONS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the structure of assembly language and wiring programming.*
2. *Develop programs using various instructions and addressing modes of 8051 microcontroller*
3. *Design and simulate the interfacing of peripherals to microcontroller board.*

COURSE OUTCOMES

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

1. *Familiar with keil programming environment*
2. *Demonstrate arithmetic, logical and string operations using assembly language programming.*
3. *Develop embedded C language programs for various applications using 8051 microcontroller.*
4. *Explore the provided example code and online resources for extending knowledge about the capabilities of the 8051 microcontrollers*
5. *Test, debug, and deploy the 8051 microcontroller-based systems*
6. *Design and develop own microprocessor/microcontroller-based solutions for the real-world problems*

Note: Minimum **Ten** Experiments to be conducted (9 from Part A and one from Part B)

Part A: 8051 Microcontroller Programming

1. a) 8-bit addition operations
   b) 8-bit subtraction operations
2. a) 8-bit Multiplication operations
   b) 8-bit Division operations
3. Logical operations on an 8-bit number
4. a) String copy
   b) String concatenation
5. Interfacing LED
6. Interfacing Push button
7. Interfacing 7 segment display
8. Interfacing ADC
9. Interfacing Sensors
10. Interfacing Actuators

Part B: Mini projects

1. 4-way Traffic light control system.
2. Three floor elevator system.
3. Automatic streetlight control system.
4. Intruder alert system.
5. Automatic Tollgate system.
6. Water level control system.
7. Digital alarm clock.
8. Electronic code lock.
9. Automatic gardening system.
10. Self-developed project

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(18HS0842) APTITUDE PRACTICES

COURSE OBJECTIVES
The objectives of this course:

1. *To evaluate various real life situations by resorting to Analysis of key issues and factors.*
2. *To read between the lines and understand various language structures.*
3. *To demonstrate various principles involved in solving Mathematical problems and thereby reducing the time taken for performing job functions.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Develop the subtle way of approaching in the candidate.*
2. *Acquired the decision making with in no time.*
3. *Implement logical thinking during professional tenure.*
4. *Improve knowledge on problem solving.*
5. *Understand problems on coding and decoding.*
6. *Apply the knowledge on the concept of reasoning in real life.*

UNIT – I

Percentages, Partnership, Ratio and Proportion**,** Time and Distance, Time and Work.

UNIT – II
Clocks, Calendars, Blood relations, Profit and Loss**,** Simple Interest, Compound Interest.

UNIT – III
Permutations and Combinations, Probability**.**
Menstruation: Areas, Volumes of different solids, Problems on Areas, Volumes and Surface Areas, Cubes.

UNIT – IV
Number and letter series: Difference series, Product series, Squares series, Cubes series, Alternate series, Combination series, miscellaneous series, Place values of letters.
Number and Letter Analogies: Definition of Analogy, Problems on number analogy.
Odd man out: Problems on number Odd man out, Problems on letter Odd man out, Problems on verbal Odd man out.

UNIT – V
Coding and decoding, Directions.

Critical Reasoning: Problems on assumption, Problems on conclusions, Problems on inferences, Problems on strengthening and weakening of arguments, Problems on principle, Problems on paradox.

TEXT BOOKS

1. Barrons GL, *Thorpe's verbal reasoning*, McGraw Hills, LSAT Materials, 2010.
2. Agarwal R S, *A modern approach to Logical reasoning*, S.Chand, 2017.

REFERENCES

1. Agarwal R S, *Quantitative Aptitude*, S Chand, 2017.
2. Barrons G L, *Quantitative Aptitude*, 2010.
3. Abhijit Guha, *Quantitative Aptitude*, *PHI Learning PVT. LTD, 2019.*
4. Tyra, *Magical Book on Quicker Maths*, BSC publishing company, 2018.

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(18HS0813) MANAGEMENT SCIENCE

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basic concepts, principles and processes of management.*
2. *To help the students gain an understanding of the functions, responsibilities ofmanagers.*
3. *To get an awareness about the latest developments and contemporary issues in thefield of management.*

COURSE OUTCOMES (COs)

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

1. *Understand appropriate theoretical frame works and utilize in real life business and managerialproblems.*
2. *Identify appropriate operational risks and develop appropriate responses to real life business and managerial problems.*
3. *Apply human resource principles to recruit, select and manage employees to achieve organizational goals.*
4. *Enact strategy, including contingent plans for the effective management of theorganization.*
5. *Identify, plan, and implement the projects and evaluate the performance of theprojects.*
6. *Analyze effective application of latest developments to diagnose and solveorganizational problems to improve the quality of the product .*

UNIT – I

Introduction to Management: Management-Concept and meaning-Nature-Functions-Management as a science and art and both. Schools of management thought - Taylor's scientific theory-Henry Fayol's principles- Weber's Ideal Bureaucracy-Eltan Mayo's Human relations-Systems theory- Situational or Contingency theory-Social responsibilities of management.

Organizational structure and design: Features of organizational structure-work specialization-Departmentation-Span of control-Centralization and Decentralization.

Organizational designs-Line Organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of organization.

UNIT – II

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study- Statistical Quality Control: C chart, P chart, (simple Problems) Deming's contribution to quality.

Material Management: Objectives-Inventory- Functions, types, inventory classification techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management.

Marketing Management: Concept- Meaning - Nature-Functions of Marketing- Marketing Mix-Channels of distribution -Advertisement and sales promotion- Marketing Strategies based on Product Life Cycle.

UNIT – III

Human Resources Management (HRM): HRM- Definition and meaning – nature-Managerial and Operative functions-Evolution of HRM-Human Resource Planning(HRP)-Employee Recruitment-sources of recruitment- employee selection- process and tests in employee selection-Employee training and development-On- the- job and Off- the- job training methods-Performance Appraisal systems-Concept-Methods of Performance Appraisal-Placement-Employee Induction-Wage and Salary Administration-Objectives-Essentials of Wage and Salary Administration- Job Analysis- Process -Job Evaluation-Employee Grievances-techniques of handling Grievances.

UNIT – IV

Strategic Management: Definition& meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis. Project Management (PERT/CPM): Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying Critical Path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT – V

Contemporary Issues in Management: The concept of MIS-Materials Requirement Planning (MRP)-Just-In-Time (JIT)System-Total Quality Management (TQM)- Six Sigma Concept-Supply Chain Management-Enterprise Resource Planning (ERP)- Performance Management-Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking - Balanced Score Card-Knowledge Management.

TEXT BOOKS

1. A.R Aryasri, *Management Science*, TMH,2013.
2. Stoner, Freeman, Gilbert, *Management*, Pearson Education,New Delhi,2012.

REFERENCES

1. Kotler Philip & Keller Kevin Lane: *Marketing Management*, PHI,2013.
2. Koontz &Weihrich, *Essentials of Management*, 6/e, TMH,2005.
3. Thomas N.Duening & John M.Ivancevich *Management Principles and Guidelines*, Biztantra.
4. KanishkaBedi, *Production and Operations Management*, Oxford University Press,2004.
5. Memoria&S.V.Gauker, *Personnel Management*, Himalaya, 25/e,2005

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(18EC0440) EMBEDDED SYSTEMS AND IOT

COURSE OBJECTIVES

The objectives of this course:

1. *To Describe the hardware and software components and development cycle of embedded systems.*
2. *To provide an overview on the ICT ecosystem and enabling environment to foster Internet of Things (including technology, standards, system management and applications) deployments.*
3. *Define the infrastructure for supporting IoT deployments.*
4. *To provide an understanding of the technologies and the standards relating to the Internet of Things.*
5. *To develop skills on IoT applications.*

COURSE OUTCOMES

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

1. *Enumerate and describe the components of an embedded system.*
2. *Understand the technology and standards relating to IoTs.*
3. *Understand where the IoT applications and Networking in IoT.*
4. *Learn the language and Identify the components and develop an IoT Applications.*
5. *Understand Sensors, Actuators, Configuration of Raspberry Pi and develop python code on Raspberry Pi for IoT application.*
6. *Apply the knowledge and skills acquired during the course to design, build and test a complete, working IoT system involving prototyping, programming and data analysis for IoT Application.*

UNIT – I

Introduction to embedded systems: Introduction - Classification – Applications – Architecture – Harvard and Von-Neuman architectures - RISC vs CISC design philosophy - Embedded processors and their types – Communication Interfaces - Onboard (I2C, SPI, UART, 1-wire interface, parallel interface) & External (RS-232 & RS-485, USB, IEEE 1394, IrDA, Bluetooth, Wi-Fi, ZigBee, GPRS) - Application specific circuitry - Reset, Brownout protection, Oscillator, RTC & Watchdog timer - Embedded firmware - Overview of design process of embedded systems – Programming languages and tools for embedded design.

UNIT – II

IoT Introduction & Concepts: Introduction to Internet of Things - Physical Design of IoT - Logical Design of IoT - IoT Enabling Technologies - IoT Levels & Deployment Templates.

UNIT – III

Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail – Logistics - Agriculture – Industry - Health & Lifestyle.

IoT and M2M: Introduction – M2M – Difference between IoT an M2M - Software Defined Networking - Network Function Virtualization for IoT.

UNIT – IV

Developing Internet of Things: IoT Design Methodology - Logical Design using Python -Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages.

UNIT – V

IoT Physical Devices & Endpoints: IoT Device – Raspberry Pi Board - Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming raspberry Pi with Python – Other IoT devices – Designing and developing IoT applications for real world problems.

TEXT BOOKS

1. Shibu K V, *Introduction to Embedded systems,* Tata McGraw-Hill Education, 1st Edition, 2009.
2. VijayMadisetti - Arshdeep Bahga, *Internet of Things a Hands-on Approach,* Arshdeep Bahga & VijayMadisetti , 1st Edition, 2014.

REFERENCES

1. Raj Kamal, *Embedded Systems,* Tata McGraw-Hill Education, 2nd Edision, 2011.
2. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things,* John Wiley and sons Ltd, 1st Edition, 2014,
3. Daniel Kellmereit - Daniel Obodovski, *The Silent Intelligence: The Internet of Things*, DnD Ventures, 1st Edition, 2013.

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(18EC0431) VLSI DESIGN

Professional Elective Course (PEC) –II

COURSE OBJECTIVES

The objectives of this course:

1. *Learn the operation of MOS Transistor and also fabrication of Various MOS transistors.*
2. *Come across to understand basic electrical properties of MOSFET.*
3. *Understand Basic MOS Transistors Inverter operation.*
4. *Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.*
5. *Learn MOS Transistor fabrication metrics.*
6. *Learn semiconductor integrated circuit architectures and CMOS testing.*

COURSE OUTCOMES (COs)

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

1. *Know the Fabrication steps of MOS transistors.*
2. *Understand basic concepts and electrical parameters related to MOS Transistors.*
3. *Know MOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.*
4. *Apply the design rues to design of digital subsystems which leads to design of electronic systems,*
5. *Analyse the impacts of scaling and performance of the system.*
6. *Understanding structure and working semiconductor IC designs and CMOS testing for an implementation of the system.*

UNIT – I

Introduction: The Future of Microelectronics, Metal Oxide semiconductor VLSI Technology, Basic MOS transistors, Basic steps of IC fabrication: nMOS, CMOS & BiCMOS.

Basic Electrical Properties of MOS And BICMOS Circuits: Drain to Source Current Ids Versus Voltage Vds Relationships, Threshold Voltage Vt, Transconductance gm and Output conductance gds, Figure of merit ω0, various pull ups loads, Bi-CMOS Inverters.

UNIT – II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates.

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, The Delay Unit, Inverter Delays,

Propagation Delays, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Transistor switches, Scaling of MOS Circuits

UNIT – III

Gate Level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits.

Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing.

UNIT– IV

Subsystem Design: Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, zero/one detectors, Counters, High Density Memory Elements.

UNIT – V

Semiconductor Integrated Circuit Design: Gate-arrays: PLDs, FPGAs, CPLDs and Standard Cells.

CMOS Testing: Need for testing, Testing during the VLSI Life cycle, test principles, design strategies for test.

TEXT BOOKS

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, *Essentials of VLSI circuits and systems*, PHI, 2013 Edition.
2. Lal Kishore and V.S.V. Prabhakar, *VLSI Design*, IK Publishers.
3. Weste and Eshraghian, *Principles of CMOS VLSI Design*, Pearson Education, 1999.

REFERENCES

1. Wayne Wolf, *Modern VLSI Design*, Pearson Education, 3rd Edition, 1997.
2. John P. Uyemura, *Chip Design for Submicron VLSI: CMOS layout and Simulation*, Thomson Learning.

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(18EC0432) WAVELETS

Professional Elective Course (PEC) –II

COURSE OBJECTIVES:

The objectives of this course:

1. *To understand the basic concepts signals, brief introduction about to fourier transform and classes of wavelets.*
2. *Discuss the continuous wavelet transform and its types.*
3. *Discuss the Discrete wavelet transform and design of different filter banks.*
4. *An overview of Applications of wavelets.*

COURSE OUTCOMES (COs)

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

1. *Understand the basics of stationary and non-stationary signals and classification of Wavelets.*
2. *Analyze the continues wavelet transform and construction of Continuous wavelet transform.*
3. *Analyze and compute Discrete wavelet transforms.*
4. *Understand the Multi resolution Analysis.*
5. *Identify the different applications of Wavelets.*
6. *Computing the DWT using filter banks.*

UNIT – I

Introduction: Stationary and non-stationary signals, signal representation using basis and frames, Brief introduction to Fourier Transform and Short time Fourier Transform, Time frequency Analysis Bases of time frequency : orthogonal, Filter banks, Multi resolution formulation: wavelets from filters ,classes of wavelets: Haar, Daubechies, bi-orthogonal

UNIT – II

Continuous Wavelet Transform: Continuous Wavelet Transform (CWT), Time and Frequency resolution of the continuous wavelet Transform, construction of continuous wavelets: spine, orthonormal, bi-orthonormal, inverse continuous wavelet transform, Redundancy of CWT, zoom property of the CWT, filtering in continuous wavelet transform domain.

UNIT – III

Discrete Wavelet Transform And Filter Banks: Orthogonal and bi orthogonal two –channel filter banks, Tree Structured filter banks, Discrete Wavelet Transform, Nonlinear approximation in the wavelet domain, multi resolution analysis, construction and computation of the discrete wavelet Transform, the redundant discrete wavelet transform.

UNIT – IV

Multi Resolution Analysis: Multi rate Discrete time Systems, Parameterization of discrete wavelets, Bio orthogonal wavelet bases, two-dimensional, wavelet Transforms and extension to higher dimensions, wave packets.

UNIT – V

Applications: Signal and image compression, Detection of Signal changes, analysis and classification of audio signals using CWT, wavelet-based signal de-noising and energy compaction, wavelets in adaptive filtering, Adaptive wavelet techniques in signal acquisition, coding and lossy transmission, image fusion, Edge detection and object isolation.

TEXT BOOKS

1. S.Mallat, *A Wavelet Tour of Signal Processing*- 2nd edition –Academic Press 1999
2. M.Vetterli and J.Kovacevic, *Wavelets and Sub band Coding*, Prentice Hall,1995.
3. Raghuveer Rao and AithS.Bopardikar, *Wavelet Transforms: Introduction, Theory and Applications*, Pearson Education Asia,2000

REFERENCES

1. Fundamentals of Wavelets : Theory, Algorithms, and Applications,- 2nd edition *J.C.Gowsami and A.K Chan,*- Wiley,2011.
2. Wavelets and their Applications- *Michel Misiti, Yves Misiti, Georges Oppenheim, jean Michel poggi, john wiley & Sons*,2010.
3. A friendly guide to Wavelets, *Gerald Keiser,Springer*,2011.
4. Multirate Systems and Filter Banks –*P.P.Vidyanathan*-Pearson Education,2004
5. Wavelets : from math too Practice-*Desanka P.Radunovik*,Springer,2009.

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(18EC0433) SATELLITE COMMUNICATION

Professional Elective Course (PEC) –II

COURSE OBJECTIVES

The objectives of this course:

1. *To introduce the basic principles of Satellite Communication systems, orbital mechanics, launchers.*
2. *To introduce the basic concepts and designing of Satellite links.*
3. *To introduce the basic concepts of earth station transceiver.*
4. *To know the basic concepts of various multiple access techniques and GPS systems.*

COURSE OUTCOMES (COs)

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

1. *Understand the basic concepts of satellite communications, orbital mechanics and launchers, earth station, multiple access techniques low earth orbit and geo-stationary satellite systems.*
2. *Understand earth station transmitter, receiver and antenna systems.*
3. *Apply frequency allocation standards, reliability techniques, and multiple access techniques power test methods to satellite systems.*
4. *Analyze satellite navigation and global positioning system.*
5. *Design Uplink and Downlink of a satellite.*
6. *Choosing different kinds of transmitter and receiver antennas to provide Uplink and Down Link Frequency.*

UNIT-I

Introduction to Satellite Communications: Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications. Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT-II

Satellite Subsystems And Link Design: Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification. Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

UNIT- III

Earth Station Technology, Low Earth Orbit And Geo-Stationary Satellite Systems: Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods. Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs.

UNIT-IV

Multiple Access Techniques: Introduction to Multiple Access, Frequency Division Multiple Access, Intermodulation, Time Division Multiple Access, TDMA Frame Structure, Code Division Multiple Access, Demand Assigned Multiple Access, difference between FDMA, TDMA and CDMA.

UNIT-V

Satellite Navigation & Global Positioning System: Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS

1. Timothi Pratt, Charles Bostian and Jeremy Allnutt, *Satellite communications,* WSE,Wiley publications, 2nd Edition, 2003.
2. Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, *Satellite communications Engineering*, Pearson Publications, 2nd Edition, 2003..

REFERENCES

1. Dennis Roddy, *Satellite communications*, McGraw Hill, 2nd Edition, 1996.
2. M. Richharia, *Satellite communications: Design principles*, BS publications, 2nd Edition, 2003.
3. D.C.Agarwal, *Satellite communications*, Khanna publications, 5th Edition.
4. K.N.Raja rao, *Fundamentals of Satellite communications*, PHI, 2004.

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(18EC0434) DIGITAL IMAGE PROCESSING

Professional Elective Course (PEC) –III

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the fundamentals of digital image processing.*
2. *To acquire the knowledge regarding transformation of images.*
3. *To know about various techniques of image enhancement.*
4. *Able to know Restoration techniques used in Image processing Compression and segmentation techniques.*

COURSE OUTCOMES (COs)

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

1. *Know the Image sensing , Acquisition and processing of image*
2. *Understand the different image transforms using algorithms.*
3. *Apply techniques to enhancement of an image.*
4. *Analyse the Image degradation/restoration and segmentation methods.*
5. *Know the various Image multi resolution .*
6. *Apply compression techniques for image storage*

UNIT – I

Introduction To Digital Image Processing: Origins of Digital Image Processing, Fundamental steps, Example fields of its usage.

Image Sensing And Acquisition: Image sensing and Acquisition – image Modeling - Sampling, Quantization and Digital Image representation – Basic relationships between pixels, - Mathematical tools/ operations applied on images - imaging geometry.

UNIT– II

Image Transforms: 2D Orthogonal and Unitary Transforms and their properties – Fast Algorithms - Discrete Fourier Transform - Discrete Cosine Transforms- Walsh- Hadamard Transforms- Hoteling Transforms, Comparison of properties of Fast Algorithms.

UNIT – III

Image Enhancement: Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement infrequency Domain, Image smoothing, Image sharpening.

Color Image Processing: Color fundamentals**,** Color Models, Color image enhancement.

UNIT– IV

Image Degradation/Restoration: Degradation model, Noise Models, Algebraic approach to restoration – Inverse filtering, Least Mean Square filters, Constrained Least square restoration.

Image Segmentation: Edge detection, Edge-linking, Threshold based segmentation methods, Region based Approaches - Template matching, Use of motion in segmentation.

UNIT – V

Wavelets And Multi Resolution Processing: Background, Multi resolution Expansions, Wavelet Transforms (WT) in One Dimensions, The Fast WT, WT in Two Dimensions, Wavelet Packets.

Image Compression: Redundancies in Images- Compression models, Information theoretic perspective-Fundamental coding theorem. Variable Length Codes-Huffman Coding, Arithmetic coding, Bit plane coding, run length coding, Transform coding, Image Formats and compression standards.

TEXT BOOKS

1. R.C. Gonzalez& R.E. Woods, *Digital Image Processing*, Addison Wesley/Pearson education, 3rd Edition, 2010.
2. A.K. Jain, *Fundamentals of Digital Image processing*, PHI.

REFERENCES

1. Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, *Digital Image processing using MATLAB*, Tata McGraw Hill, 2010.
2. S jayaraman, S Esakkirajan, T Veerakumar, *Digital Image processing*, Tata McGraw Hill

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(18EC0435) SPEECH AND AUDIO PROCESSING

Professional Elective Course (PEC) – III

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basic concepts of processing speech and audio signals.*
2. *To study and analyze various M-band filter-banks for audio coding.*
3. *To understand audio coding based on transform coders.*
4. *To explore the time and frequency domain speech processing methods.*

COURSE OUTCOMES (COs)

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

1. *Understand basic concepts of speech production, speech analysis.*
2. *Analyse the Time-Frequency for speech and Audio*
3. Understand *various time domain methods for speech processing.*
4. *Apply frequency domain methods for speech processing.*
5. *Apply predictive analysis of speech in the applications.*
6. *Design systems for various applications of speech processing.*

UNIT – I

Mechanics of Speech And Audio: Introduction - Review of Signal Processing Theory-Speech production mechanism – Nature of Speech signal – Discrete time modelling of Speech production – Classification of Speech sounds – Phones – Phonemes – Phonetic and Phonemic alphabets – Articulatory features. Absolute Threshold of Hearing - Critical Bands- Simultaneous Masking, Masking-Asymmetry, and the Spread of Masking- Non simultaneous Masking - Perceptual Entropy - Basic measuring philosophy -Subjective versus objective perceptual testing - The perceptual audio quality measure (PAQM) - Cognitive effects in judging audio quality.

UNIT – II

Time-Frequency Analysis: Filter Banks And Transforms: Introduction - Analysis-Synthesis Framework for M-band Filter Banks- Filter Banks for Audio Coding: Design Considerations - Quadrature Mirror and Conjugate Quadrature Filters - Tree-Structured QMF and CQF M-band Banks - Cosine Modulated "Pseudo QMF" M-band Banks -Cosine Modulated Perfect Reconstruction (PR) M-

band Banks and the Modified Discrete Cosine Transform (MDCT) - Discrete Fourier and Discrete Cosine Transform - Pre-echo Distortion- Pre-echo Control Strategies.

UNIT – III

Audio Coding And Transform Coders: Lossless Audio Coding – Lossy Audio Coding - ISO-MPEG-1A, 2A, 2A-Advaned, 4A Audio Coding - Optimum Coding in the Frequency Domain - Perceptual Transform Coder –Brandenburg - Johnston

Hybrid Coder - CNET Coders - Adaptive Spectral Entropy Coding –Differential Perceptual Audio Coder - DFT Noise Substitution -DCT with Vector Quantization -MDCT with Vector Quantization.

UNIT – IV

Time & Frequency Domain Methods For Speech Processing: Time domain parameters of Speech signal – Methods for extracting the parameters: Energy, Average Magnitude – Zero crossing Rate – Silence Discrimination using ZCR and energy Short Time Fourier analysis – Formant extraction – Pitch Extraction using time and frequency domain methods Homomorphic Speech Analysis: Cepstral analysis of Speech – Formant and Pitch Estimation – Homomorphic Vocoders.

UNIT – V

Predictive Analysis Of Speech: Formulation of Linear Prediction problem in Time Domain – Basic Principle – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm – lattice formation and solutions – Comparison of different methods – Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP.

TEXT BOOKS

1. B.Gold and N.Morgan, *Speech and Audio Signal Processing*, Wiley and Sons, 2000.
2. L.R.Rabiner and R.W.Schaffer, *Digital Processing of Speech Signals*, Prentice Hall, 1978.
3. Mark Kahrs, Karlheinz Brandenburg, *Kluwer Applications of Digital Signal Processing to Audio and Acoustics*, Academic Publishers.
4. Udo Zolzer, *Digital Audio Signal Processing*, Second Edition A John Wiley& sons Ltd.

REFERENCES

1. L. R. Rabiner and B. Juang, *Fundamentals of Speech Recognition*, Pearson Education (Asia) Pvt. Ltd., 2004.
2. Z. Li and M.S. Drew, ―*Fundamentals of Multimedia*‖, Pearson Education (Asia) Pvt. Ltd., 2004.
3. D. O'Shaughnessy, *Speech Communications: Human and Machine*, Universities Press, 2001.

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(18EC0436) HI SPEED ELECTRONICS

Professional Elective Course (PEC) –III

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basic concepts of High Speed Devices and High Speed Circuits.*
2. *Discuss the nature, uses OF Materials for High Speed Devices and Circuits.*
3. *To understand the functioning of Silicon based MOSFET and BJT circuits for high speed operation.*
4. *An overview of Semiconductor Materials and Physics.*

COURSE OUTCOMES (COs)

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

1. *Know the basic Semiconductor Materials and Physics and their importance in design of high speed circuits.*
2. *understand the functioning of Silicon based MOSFET and BJT circuits for high speed operation*
3. *Able to analyse various methods for high speed low power applications.*
4. *Know the Difference between High Electron Mobility Transistors and Silicon based MOSFET.*
5. *Design high speed electronic circuit by using appropriately High Speed Devices and Circuits*
6. *Familiar with features of various Logic coupled circuits with scaled down devices.*

UNIT – I

Review Of Semiconductor Materials and Physics: Executive summary, Semiconductor materials, Crystal directions and planes, atomic bonding, Quantum mechanics, Electrons in a semiconductor, Semiconductors in equilibrium, Direct and indirect semiconductors.

Electronic devices: p–n junction, Schottky diode, Silicon–germanium, heterostructures, High electron mobility transistor, Radio Frequency MOSFETs, Bipolar and hetero-bipolar transistors

UNIT – II

Materials For High Speed Devices And Circuits: Merits of III –V binary and ternary compound semiconductors (GaAs, INP, In GaAs, and AlGaAsETC.), silicon-germanium alloys and silicon carbide for high-speed devices, as compared to silicon based devices. Brief outline of the crystal structure, Dopants and electrical properties such as carrier mobility, velocity versus electric field characteristics of these materials. Material and device process technique with these III-V and IV – IV semiconductors.

UNIT – III

Silicon Based MOSFET And BJT Circuits For High Speed Operation: Emitter coupled Logic (ECL) and CMOS Logic circuits with scaled down devices. Silicon On Insulator (SOI) wafer preparation methods and SOI based devices and SOICMOS circuits for high speed low power applications.

UNIT – IV

High Electron Mobility Transistors (HEMT): Hetero-junction devices. The generic Modulation Doped FET(MODFET) structure for high electron mobility realization. Principle of operation and the unique features of HEMT InGaAs/InP HEMT structures.

UNIT – V

High Speed Circuits And Tunneling Devices: GaAs Digital Integrated Circuits for high speed operation- Direct Coupled Field Effect Transistor Logic (DCFL), Schottky Diode FET Logic (SDFL), Buffered FET Logic (BFL), SJ MOSFET.GaAs FET Amplifiers. Monolithic Microwave Integrated Circuits (MMICs) Resonant- tunneling hot electron transistors and circuits.

TEXT BOOKS

1. Sheilaprasad -hermann schumacher - anand gopinath, *High-Speed Electronics and Optoelectronics: Devices and Circuits***,** TataMcGraw-Hill.
2. *Robert Pierret-Pearson- PrenticeHall, Semiconductor Device Fundamentals*– 3th Edition-. III-V High Electron Mobility Transistor Technologies

REFERENCES

1. **Baliga**, B. Jaya, *Advanced Power MOSFET Concepts*-,Wiley Publishers
2. Refer the course contents at NPTEL website of IIT Madras of course- *High Speed Devices and Circuits.*

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(18EC0437) MOBILE COMMUNICATIONS AND NETWORKS

Professional Elective Course (PEC) –IV

COURSE OBJECTIVES

The objectives of this course:

1. *To provide the student with an understanding of the cellular concept, frequency reuse, hand-off strategies.*
2. *To provide the student with an understanding of Co-channel and Non-Co-Channel interferences.*
3. *To give the student an understanding of cell coverage for signal and traffic, diversity techniquesand channel assignment.*
4. *To give the student an understanding types of handoff.*
5. *To understand challenges and application of Adhoc wireless Networks.*

COURSE OUTCOMES (COs)

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

1. *Know the evolution of cellular and mobile communication system.*
2. *Uunderstand Co-Channel and Non-Co-Channel interferences.*
3. *Understand impairments due to multipath fading channel and to overcome the different fading effects.*
4. *Familiar with cell coverage for signal and traffic, diversity, techniques, frequency management,Channel assignment and types of handoff.*
5. *Understand the Importance of Handoffs and reduction of dropped Calls.*
6. *Design mobile communication system by appropriately selecting necessary techniques.*

UNIT - I

Introduction To Cellular Mobile Radio Systems: Limitations of Conventional Mobile Telephone Systems. Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems. Uniqueness of Mobile Radio Environment-Fading-Tie Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I from a Normal Case in a Omni Directional Antenna System, System Capacity Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT – II

Co-Channel Interference: Measurement of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and their effects, diversity techniques-space diversity, polarization diversity, frequency diversity, time diversity.

Non-Co-Channel Interference: Adjacent Channel Interference, Near end far end interference, cross talk, effects on coverage and interference by power decrease, antenna height decrease, effects of cell site components.

UNIT – III

Cell Coverage For Signal And Traffic: Signal Reflections in flat and Hilly Terrain, effects of Human Made Structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long-distance propagation, path loss from a point to point prediction model in different conditions, merits of lee model.

Frequency Management And Channel Assignment: Numbering and Grouping, Setup Access and Paging Channels, Channel Assignments to Cell Sites and Mobile Units.

UNIT - IV

Handoffs And Dropped Calls: Handoff Initiation, types of Handoff, Delaying Handoff, advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem handoff, Introduction to Dropped Call Rates and their Evaluation.

UNIT - V

Ad Hoc Wireless Networks: Introduction, Cellular and Ad Hoc wireless Networks, Applications and Ad Hoc Wireless Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet, MAC Protocols for Ad Hoc Wireless, Introduction, issues in designing AMAC Protocol for Ad Hoc wireless Networks, Design Goals of AMAC protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols.

TEXT BOOKS

1. W.C.Y. Lee, *Mobile Cellular Telecommunications*- Mc Graw Hill, 2nd Edn., 1989.
2. S. Rapport Theodore, *Wireless Communications*- Pearson Education, 2nd Edn., 2002.

REFERENCES

1. C. Siva ram Murthy and B.S. Manoj, *Ad Hoc Wireless Networks: Architectures and Protocols*- 2004, PHI.
2. Haykin, Michael Moher, *Modern Wireless Communications-Simon,* Pearson Education, 2005.
3. Vijay Garg, *Wireless Communications and Networking*, , Elsevier Publications, 2007.
4. Andrea Goldsmith, *Wireless Communications*- Cambridge University Press, 2005.

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IV B. Tech. – I Sem. (E.C.E)

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(18EC0438) FIBER OPTIC COMMUNICATIONS

Professional Elective Course (PEC) –IV

COURSE OBJECTIVES

The objectives of this course:

1. *To understand Optical Fiber Communications.*
2. *To understand the Ray Theory, single& amplitude; multimode fibers, fiber materials, losses, dispersion in OFC.*
3. *To understand the connectors, splices, couplers, LASER, LED sources.*

COURSE OUTCOMES (COs)

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

1. *Learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.*
2. *Understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.*
3. *Learn the various optical source materials and optical receivers such as LED structures, quantum efficiency, Laser diodes, PIN, APD diodes, noise performance in photo detector, receiver operation and configuration.*
4. *Analyze the use of analog and digital links such as the various criteria like power loss wavelength to be considered for point-to-point link in digital link system.*
5. *Learn the fiber optical network components, variety of networking aspects,and operational principles WDM*
6. *Analyze the different techniques to improve the capacity of the system.*

UNIT-I

Introduction: Evolution of fiber optic system, The general Optical Communication System, Advantages & disadvantages of Optical fiber communication, Ray Theory transmission: Optical Fiber Structure and colour coding, Total internal reflection, Angle of incidence, Refractive Index, Numerical Aperture, Skew Rays.

Optical Fiber Modes: Mode theory of Circular Wave guides, Optical Fiber Modes and Configurations, Types of fiber optic modes and its structure - Single mode & multimode fibers, Step index & graded index fibers, dispersion compensation fibers.

UNIT-II

Transmission Characteristics Of Optical Fibers: Attenuation, Absorption losses, scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave Guides-Information Capacity determination, Group Delay, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion. Working principle of OTDR and its applications.

UNIT-III

Fiber Optical Sources and Coupling: Direct and indirect Band gap materials, LED structures, Light source materials, Quantum efficiency and LED power, Modulation of a
LED, lasers Diodes-Modes and Threshold condition, Rate equations, External Quantum efficiency, Resonant frequencies, Temperature effects.

UNIT- IV

Fiber Optical Receivers: PIN and APD diodes, Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise, Comparison of Photo detectors. Fundamental Receiver Operation, pre-amplifiers, Error Sources, Receiver Configuration.

UNIT- V

Optical Fiber System Design & Technology: System specification, Rise Time Budget, Bandwidth Budget, Power Budget (Adaptors, Attenuators and its effects must be explained) and Receiver Sensitivity, Link Budget calculations, Optical Multiplexing & Demultiplexing techniques, Optical Amplifiers and its Applications.

TEXT BOOKS

1. Gerd Keiser, *Optical Fiber Communication,* McGraw –Hill International, Singapore, 3rd ed.,2000.
2. J.Senior, *Optical Communication, Principles and Practice,* Prentice Hall of India, 1994.

REFERENCES

1. Max Ming-Kang Liu, *Principles and Applications of Optical Communications*, TMH, 2010.
2. S.C. Gupta, *Text book on optical fiber communication and its applications*, PHI, 2005.
3. Satish Kumar, *Fundamentals of Optical Fiber communications*, PHI, 2008.

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(18EC0439) BIO MEDICAL ELECTRONICS
Professional Elective Course (PEC) –IV

COURSE OBJECTIVES
The objectives of this course:

1. *Understand the various physiological parameters both electrical and non-electrical methods of recording and also method of transmitting these parameters.*
2. *Learn about the various assist devices used in the hospitals.*
3. *Understand the equipment used for physical medicine and various recently developed diagnostic and therapeutic techniques.*
4. *Understand the working of ventilators.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Understand Bio potentials in medical domain.*
2. *Know the working of Non-Electrical Parameter measurement devices.*
3. *Understand the operations of medical health Assist Devices.*
4. *Apply the telemedicine and telemetry for patient in Medical field.*
5. *Know the working principle of Measuring, Recording and Monitoring equipment*
6. *Know the different types of ventilators, electronic components and its working.*

UNIT - I
Electro-Physiology And Bio-Potential Recording: The origin of Bio-potentials; bio potential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT - II
Bio-Chemical And Non-Electrical Parameter Measurement: pH, PO2, PCO2, colorimeter, Auto analyser, Oximeters, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT - III
Assist Devices: Cardiac pacemakers, DC Defibrillator, Dialyser, Heart lung machine107.

UNIT - IV

Physical Medicine And Biotelemetry: Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radio pill, electrical safety

UNIT - V

Recent Trends In Medical Instrumentation: Thermograph, Endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine.

Ventilators: Mechanics of respiration, Artificial Ventilation, Ventilators, Types of ventilators, Ventilator terms, Classification of ventilators, Pressure-Volume-Flow diagrams, Modern ventilators, High frequency ventilators, Humidifiers, Nebulizers, and Aspirators.

TEXT BOOKS

1. Leslie Cromwell, *Biomedical instrumentation and measurement*, Prentice Hall of India, New Delhi, 2007.
2. John G.Webster, *Medical Instrumentation Application and Design*, 3rd Edition, Wiley India Edition, 2007.

REFERENCES

1. Khandpur, R.S., *Handbook of Biomedical Instrumentation*, TATA McGraw-Hill, New Delhi, 2003.
2. Joseph J.Carr and John M.Brown, *Introduction to Biomedical equipment Technology*, John Wiley and Sons, New York, 2004.

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(18CE0146) PROJECT PLANNING AND CONTROL

(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course:

1. *To describe various elements of an engineering project and to draw the network*
2. *To perform PERT & CPM calculations and to identify the critical path*
3. *To perform various operations on the network*

COURSE OUTCOMES (COs)

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

1. *Differentiate various tools for planning and controlling the project*
2. *Construct the network for a project*
3. *Perform PERT computations and evaluate the critical path*
4. *Perform CPM computations and identify the critical path*
5. *Optimize time and cost for a project*
6. *Work with network during the progress of a project by updating the network and allocating the resource*

UNIT – I

Project Management: Project planning – Project scheduling – Project controlling – Project monitoring and control – Project monitoring and information cell – Decision making in project management – Project life cycle

Basic Techniques of Project Management: Bar charts – Steps for the construction of a bar chart – Limitations of bar charts – Milestone charts – Velocity diagrams – Development of Network – CPM/PERT Networks – Advantages of network over milestone chart

UNIT – II

Elements of Network: Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles

Development of Network: Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure – Hierarchies

UNIT – III

PERT: Time Estimates: Uncertainties: Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time

PERT: Time Computations & Network Analysis: Earliest expected time – Formulation for T_E – Latest allowable occurrence time – Formulation for T_L – Combined tabular computations for T_E and T_L – Slack – Critical path – Probability of meeting scheduled date

UNIT – IV

CPM: Network Analysis: CPM Process – CPM Network – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L – Start and finish times of activity – Float – Critical activities and critical path

UNIT – V

CPM: Cost Model: Project cost – Indirect project cost – Direct project cost – Slope of direct cost curve – Total project cost and optimum duration – Contracting the network for cost optimization – Steps in time cost optimization

CPM: Updating: Updating process – Data required for updating – Steps in the process updating – When to update

Resources Allocation: Resources usage profiles: histograms – Resources smoothing – Resources levelling

TEXT BOOKS

1. Dr.B.C. Punmia, K.K. Khandelwal, *Project Planning and Control with PERT AND CPM,* Laxmi Publications (P) Ltd., 4th Edition, Reprint 2006
2. Dr.P.N. Modi, Sanjeev Modi and Rajeev Modi, *Program Evolution and Review Technique and Critical Path Method,* Standard Book House, 5th Edition, 2012

REFERENCES

1. L.S. Srinath, *PERT and CPM Principles and Applications,* Affiliated East-West Press (Pvt.) Ltd.
2. S.K. Bhattacharjee, *Fundamentals of PERT/CPM and Project Management,* Khanna Publishers
3. Kumar Neeraj Jha, *Construction Project Management: Theory and Practice,* Pearson, 2rd edition, 2015

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(18EE0236) SOLAR PHOTOVOLTAIC SYSTEMS
(Open Elective-II)

COURSE OBJECTIVES
The objectives of the course:

1. *To develop a comprehensive technological understanding in solar PV system components*
2. *To provide in-depth understanding of design parameters to help design and simulate the performance of a solar PV power plant*
3. *To pertain knowledge about planning, project implementation and operation of solar PV power generation*

COURSE OUTCOMES (COs)
On successful completion of the course, the student should be able to

1. *Understand of renewable and non-renewable sources of energy*
2. *Gain knowledge about working principle of various solar energy systems*
3. *Analyse the solar power PV power generation*
4. *Applying the knowledge on to installation and integration of PV modules for different applications*
5. *Understand the operation of different solar collectors in the market*
6. *Understand the solar thermal energy storage systems*

UNIT-I
Introduction: Sources of renewable energy; global potential for solar electrical energy systems. Solar radiation. Extra terrestrial and terrestrial solar spectrum; clear sky direct-beam radiation; total clear sky insulation on a collecting surface; radiation on the collector in tracking systems; calculation of average monthly insolation from measured data

UNIT-II
PV cells and modules: Solar Cell and its function, Solar Technologies, Solar Cell Parameters, Efficiency of Solar Cell, Solar PV Module, Rating of Solar PV Module, PV Module Parameters, Efficiency of PV Module, Measuring Module Parameters

UNIT-III
Solar Photovoltaic Module Array: Connection of PV Module in Series and Parallel, Estimation and Measurement of PV Module Power, Selection of PV Module.

UNIT-IV

Solar PV System Design and Integration: Solar Radiation Energy Measurements, Estimating Energy requirement, Types of Solar PV System, Design methodology for SPV system, Design of Off Grid Solar Power Plant, Case studies of 3KWp Off grid Solar PV Power Plant, Design and Development of Solar Street Light and Solar Lantern, Off Grid Solar power Plant.

UNIT-V

Solar collectors and Solar energy storage: Different types of solar collectors, Flat plate and concentrated type collectors, Fundamental Terminologies of thermal storage, Sensible heat storage materials, Latent heat storage materials, Solar thermo-chemical energy storage systems, Advantages and disadvantages of solar thermal storage, application of thermal storage

TEXT BOOKS

1. Chetansingh solanki *Solar Photovoltaic* PHI, Learning private ltd., New Dehli- 2018.
2. G.D Rai *Non-conventional Sources of Energy* Khanna Publishers, Delhi, 2012.

REFERENCES

1. Chetan Singh Solanki *Renewable Energy Technologies; A Practical Guide for Beginners* PHI School Books (2008)
2. Kothari D.P. and Signal K.C *Renewable Energy Sources and Emerging Technologies*, New Arrivals –PHI; 2 Edition (2011)

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(18ME0353) COMPUTER AIDED PROCESS PLANNING

(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course:

1. *Provide the student with an understanding of the importance of process planning role in manufacturing.*
2. *Classify the various methods of CAPP*
3. *Understand the importance of product development through CIMS, shop floor control, Computer Integrated Manufacturing and Automation*
4. *Understands about NC, CNC and DNC systems.*
5. *Know about capacity Planning, Adaptive control machining systems, FMS and MRP's*

COURSE OUTCOMES (COs)

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

1. *Know the importance of process planning role in manufacturing*
2. *Describe the various methods of CAPP*
3. *Recognize the importance of product development through CIMS, shop floor control, Computer Integrated Manufacturing and Automation*
4. *Gain the knowledge about NC, CNC and DNC systems.*
5. *Identify about capacity Planning, Adaptive control machining systems*
6. *Familiar in FMS and MRP I and MRP II*

UNIT- I

Introduction to Process Planning: Role of process planning in the manufacturing cycle- Information requirement for process planning system - Merits of conventional process planning over CAPP - Structure of automated process planning system, features recognition, methods.

UNIT- II

Generative CAPP System: Importance - Generative CAPP system - Automation of logical decisions - Knowledge based systems - Inference Engine, implementation, benefits.

Retrieval CAPP System: Significance - Retrieval CAPP system, structure, relative advantages and disadvantages- implementation and applications.

UNIT- III

Implementation Techniques for CAPP: MIPLAN system - The Bottom-up approach - The Top-Down approach - Computer programming languages for CAPP- Criteria for selecting a CAPP system - Benefits of CAPP - MRP - I, MRP - II and benefits.

UNIT- IV

Computer Integrated Production Planning: Capacity planning- shop floor control- MRP-I, MRP-II- CIMS benefits.

Computer Integrated Manufacturing System (CIMS): Introduction to CIMS, Automation strategies, Automation and CAD/CAM, Scope of CIM- Computer controls in NC- NC, CNC and DNC systems, components, block diagram, applications- Part programming- Group technology, benefits.

UNIT- V

Flexible Manufacturing systems (FMS): Components of FMS, workstation, Material handling system and computer control system, FMS Layout configurations and benefits of FMS.

Adaptive control machining systems: Introduction to adaptive control machining systems, application- approaches, adaptive control optimization system, adaptive control constraint system, applications to machining processes, computer process monitoring and computer process control.

TEXT BOOKS

1. Mikel P.Groover *Automation, Production systems and Computer Integrated Manufacturing Systems*, Pearson Higher Education, Inc., 4th Edition, 2015.
2. Dr. Sadhu Singh, *Computer Aided Design and Manufacturing*, Khanna Publishers, 2009.

REFERENCES

1. Gideon Halevi and Roland D. Weill, “Principles of Process Planning", A logical approach, Chapman & Hall, 1995.
2. Chang T C and Richard A Wysk, “An Introduction to automated process planning systems”, Prentice Hall, 1985.
3. H.P. Wang and J.K. Li, “Computer Aided Process Planning”, Elsevier Science and Technology Publishers, 1st edition, 1991.

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(18CS0544) SOFTWAR DEVELOPMENT & TESTING

(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course:

1. *Illustrate the Software Development Models.*
2. *Explain Software Requirements Engineering Process and SRS document.*
3. *Illustrate the importance of modeling and modeling languages.*
4. *Explain various testing methodologies.*
5. *Explain Quality assurance and test cases.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Define and develop as software project from requirement gathering to implementation.*
2. *Ability to code and test the software.*
3. *Ability to plan, estimate and maintain software systems.*
4. *Understand the basic testing procedures.*
5. *Able to generate test cases and test suites.*
6. *Test the applications manually by applying different testing methods and automation tools.*

UNIT – I

Introduction: Introduction to Software Engineering , Software Process, Software Myths, A generic view of process, A layered Technology, A Process Framework, Software Process Models, Unified process

Introduction to Agility: Agility, Agile Process, Agile Process Models

UNIT – II

Requirements Analysis and Specification: Requirements Engineering, Eliciting Requirements, Requirements Analysis, Types of Requirements, Requirement Modeling and Data Modeling concepts.

Architectural Design Concepts: The Design Process, Design Concepts, Design Model, Software Architecture, Architecture Styles.

UNIT – III

User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

Web App Design: Introduction, Web App Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component-Level Design

UNIT – IV

Software Testing: Introduction, Levels of Software Testing – Unit Testing, Module Testing, Integration Testing, System Testing, Acceptance Testing, Alpha Testing, Beta Testing,

Approach to Software Testing: Types of Software Testing - Black Box Testing, White Box Testing, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Art of Debugging.

UNIT – V

Software Quality: Software Testing Life Cycle, Software Quality, Testing Principles, Test Process – Testing Activities, Quality Assurance.

Software Test Cases: Introduction to Test cases, Test Case Selection – Test Planning and Design – Test Execution – Case Study on Test tools and automation.

TEXT BOOKS

1. Roger S.Pressman, *Software Engineering- A practitioner's Approach*, McGraw-Hill International Edition, seventh edition, 2001.
2. Boris Beizer, Dreamtech, *Software Testing techniques*, Second Edition

REFERENCES

1. Ian Sommerville, *Software Engineering*, 8th Edition, Pearson Education, 2008.
2. Richard Fairley, *Software Engineering Concepts* , McGraw Hill, 2004.
3. Dr.K.V.K.K.Prasad, *Software Testing Tools*, Dreamtech.

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(18HS0815) ENTREPRENEURSHIP DEVELOPMENT

(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course:

1. *To acquire necessary skills and knowledge required for organizing and carrying out entrepreneurial activities.*
2. *To develop the ability of analyzing and understanding business situations in which entrepreneurs act.*
3. *To develop the ability of analyzing various aspects of entrepreneurship – especially of taking over the risk, and the specificities as well as the pattern of entrepreneurship development.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *The ability to discern distinct entrepreneurial traits and identify the successful elements of successful entrepreneurial ventures.*
2. *Consider the legal and financial conditions for starting a venture and to assess the opportunities and constraints for new ventures.*
3. *Design strategies for the successful implementation of ideas.*
4. *To comprehend the evaluation of business opportunity from the prospective of an investor.*
5. *Identify the most suitable sources of finance for start-ups.*
6. *To write and execute their own business plan.*

UNIT-I

Introduction to Entrepreneurship: Concept of Entrepreneur‘s, Enterprise and Entrepreneurship; Characteristics, Qualities, Functions of entrepreneur and Advantages of Entrepreneurship; Role of entrepreneurship in Economic development, Challenges faced by entrepreneurs, Entrepreneurial scenario in India and Abroad; Elements of Social Entrepreneurship, Types of Entrepreneurs, Entrepreneurship vs. Intrapreneurship.

UNIT-II

Small Business and its Importance: Introduction, Need, Classification of Micro, Small d Medium Enterprises (MSMEs),RoleofMSMEs, Problems of MSMEs,Steps for Starting MSMEs, The role of government in supporting MSMEs in India.

Forms of Business Organization: Evaluation of Form of Business organization: Sole Proprietorship, Partnership, Joint Hindu Family, Joint Stock Company and Co-operative Society. Special forms of business ownership: Licensing, Franchising and Leasing.

UNIT-III

Innovation and Idea Generation in Entrepreneurship: Concept of Invention and Innovation, types of innovation, Sources of Innovation, Importance of Innovation in Entrepreneurship. Sources of new ideas, Methods of generating ideas and Opportunity recognition and idea generation in entrepreneurship. Intellectual Property Rights (IPRs): Patents, trademarks, copyrights, and trade secrets. E-commerce and Business Start-ups, Sources of information for Start-up Entrepreneurs in India. Problems of Start-ups without IPRs.

UNIT-IV

Entrepreneurial Motivation: Concept of Motivation and Factors influencing the entrepreneurs; Motivational Theories-Maslow's Need Hierarchy Theory, McClelland's Acquired Need Theory. Entrepreneurship Development Programs (EDPs) - Need and Role of EDPs. Opportunities for entrepreneurship in present scenario. Successful entrepreneurs.

Financing of Enterprises: Source of financing - Debt capital, seed capital, venture capital, Loans available for starting ventures in India, Role of government agencies in small business financing. Role of consultancy organizations.

UNIT-V

Project Planning and Feasibility Study - Meaning of Project, Project Life Cycle, and Stages of Planning Process. Project Planning and Feasibility, Project proposal and report preparation.

TEXT BOOKS

1. *Entrepreneurship*, 8/e, Robert D Hisrich, Mathew J.Manimala, Michael Peters, Dean A. Shepherd, McGraw Hill Education.
2. *The Dynamics of Entrepreneurial Development and Management*, Vasanth Desai, Himalaya Publishing House, Mumbai.

REFERENCES

1. S.S. Khanka, *Entrepreneurial Development,* , S. Chand and Company Limited.,
2. H. Nandan, *Fundamentals of Entrepreneurship,* , PHI.
3. Bholanath Dutta, *Entrepreneurship Management* – text and cases, , Excel Books.
4. Holt, *Entrepreneurship – New venture Creation*, PHI.
5. Ramachandran, *Entrepreneurial Development*, Tata McGraw Hill, New Delhi.

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(18EC0423) EMBEDDED SYSTEMS AND IOT LAB

COURSE OBJECTIVES

The objectives of this course:

1. *Configure Raspberry Pi, Understand Sensors, Actuators & get started with python on Raspberry Pi.*
2. *Understand how cloud services work.*
3. *Design IoT applications in different domain and be able to analyze their performance.*

COURSE OUTCOMES

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

1. *Identify the requirements for the real-world problems.*
2. *Conduct a survey of several available literatures in the preferred field of study.*
3. *Study and enhance software/ hardware skills.*
4. *Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.*
5. *Understand use of cloud for remote monitoring and control of IoT enabled systems.*
6. *Design and development of IoT enabled technologies which are cost effective and socially relevant.*

Note: Perform **Ten** Experiments and any **one** use case

Programs:

1. Interfacing LED's
2. Interfacing Push buttons.
3. Interfacing Sensors.
4. Interfacing Actuators.
5. Interfacing Camera.
6. Interfacing Serial communication devices
7. CRUD operations on input device data in cloud server.
8. Controlling output devices over internet.
9. Notification alert over internet.
10. Location Tracking.

Use cases:

1. Smart Communication - Designing and developing devices which would help in easing communication channels between various communication devices and points.
2. Healthcare & Biomedical devices - Designing and developing devices that would help in managing healthcare better.
3. Agriculture & Rural Development - Designing and developing devices keeping in mind the need to enhance the primary sector of India - Agriculture and the lives of our Rural Population.
4. Smart Vehicles - Creating intelligent devices to improve commutation facilities, quality of travel experience and overall travel safety features hardware.
5. Food Processing - Creating state of art solutions to manage and process our agriculture produce.
6. Robotics and Drones – Designing and developing drones and robots that can solve some of the pressing challenges of India such as handling medical emergencies, search and rescue operations, etc.
7. Waste management – Providing IoT solutions could be in the form of waste segregation, disposal, and improved transportation system.
8. Clean water – Creating innovative devices to improve distribution, management and purification of water.
9. Security & Surveillance – Creating state-of-the-art safety and security technologies for India.
10. Renewable Energy – Innovative solutions that help manage and generate renewable sources more efficiently using IoT.
11. Miscellaneous – Providing IoT solutions in tertiary sectors like Hospitality, Financial Services, Entertainment, Tourism, Retail,etc.

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(18EC0424) MICROWAVE MEASUREMENTS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To study and analyze microwave components by measuring various parameters.*
2. *To be able to measure wave parameter like impedance, frequency, wavelength using microwave bench and VSWR/power meter. To study various Digital and Hybrid modulation and demodulation schemes.*
3. *To analyze radiation pattern of horn antenna*.

COURSE OUTCOMES (COs)

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

1. *Able to identify and demonstrate the working of various microwave components.*
2. *Able to analyze Microwave Passive Devices by conducting experiments and measuring various parameters.*
3. *Able to analyze Microwave Active Devices by conducting experiments and measuring various parameters.*
4. *Understand the standing wave and measure scattering coefficients of various microwave components.*
5. *Assess the amount of bandwidth/bit rate required in each modulation scheme and compare the schemes.*
6. *Analyze antenna performance by conducting experiments and measuring various parameters.*

LIST OF EXPERIMENTS:

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength measurements using slotted section.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.
10. Radiation pattern measurements of horn Antennas (at least two antennas).