JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., Act. No. 30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Course Structure & Syllabi for B.Tech. (Regular)
R13 Regulations

ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech. I Year

S.No	Course code	Subject	Theory	Tu/	Lab.	Credits
1.	13A52101	Communicative English	2	-	-	3
2.	13A56101	Engineering Physics	2	-	-	3
3.	13A51101	Engineering Chemistry	2	-	-	3
4.	13A54101	Mathematics - I	3	1	-	5
5.	13A12101	Programming in C & Data Structures	3	1	-	5
6.	13A54102	Mathematics - II	3	1	-	5
7.	13A04101	Network Analysis	3	1	-	5
8.	13A12102	Programming in C & Data Structures Lab	-	-	3	4
9.	13A99102	Engineering Physics & Engineering Chemistry Lab *	-	-	3	4
10.	13A99103	Engineering & IT Workshop #	-	-	3	4
11.	13A52102	English Language Comm. Skills Lab	-	-	3	4
Total Credits						45

Th = Theory; Tu = Tutorial & Lab = Laboratory:

* The students shall attend the Physics lab and Chemistry lab in alternate weeks. The end exam shall be conducted separately and average of the two exams shall be recorded by the University exam section.

The **s**tudents shall attend Engineering and IT work shop as a single lab every week and the end exam is conducted as a single lab. Sharing the Maximum marks and time for one task each from Engineering workshop and IT workshop. The sum of the marks awarded shall be recorded.

B.Tech. II - I Semester

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A54302	Mathematics - III	3	1 -	3
2.	13A04301	Electronic Devices & Circuits	3	1 -	3
3.	13A04302	Signals & Systems	3	1 -	3
4.	13A04303	Switching Theory & Logic Design	3	1 -	3
5.	13A04304	Probability Theory & Stochastic Processes	3	1 -	3
6.	13A02303	Electrical Technology	3	1 -	3
7.	13A02304	Electrical Engineering Lab	-	- 3	2
8.	13A04305	Electronic Devices & Circuits Lab	-	- 3	2
9.	13A52301	Human Values and Professional Ethics(Audit Course)	2	- -	-
Total Credits					22

B.Tech. II - II Semester

S.No	Course code	Subject	Theory	Tu / Drg / Lab	Credits
1.	13A01403	Environmental Science	3	1 - -	3
2.	13A04401	Pulse & Digital Circuits	3	1 - -	3
3.	13A04402	Electronic Circuits Analysis & Design	3	1 - -	3
4.	13A04403	Electromagnetic Theory & Transmission Lines	3	1 - -	3
5.	13A03304	Engineering Graphics	1	- 3 -	3
6.	13A04404	Analog Communication Systems	3	1 - -	3
7.	13A04405	Electronic Circuits Analysis & Design Lab	-	- - 3	2
8.	13A04406	Pulse & Digital Circuits Lab	-	- - 3	2
Total Credits					22

B.Tech. III - I Semester

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A02402	Control Systems Engineering	3	1 -	3
2.	13A05401	Computer Organization & Architecture	3	1 -	3
3.	13A04501	Antennas & Wave Propagation	3	1 -	3
4.	13A04502	Digital Communication Systems	3	1 -	3
5.	13A04503	Linear IC Applications	3	1 -	3
6.	13A04504	Digital IC Applications	3	1 -	3
7.	13A04505	IC Applications Lab	-	- 3	2
8.	13A04506	Analog Communication Systems Lab	-	- 3	2
Total Credits					22

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Revised Course Structure for B.Tech.- R13 Regulations

ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech III - II Semester

S.No	Course code	Subject	Theory	Tu	Lab	Credits
1.	13A52501	Managerial Economics & Financial Analysis	3	1		3
2.	13A04601	Microprocessors & Microcontrollers	3	1		3
3.	13A04602	Digital Signal Processing	3	1	-	3
4.	13A04603	Microwave Engineering	3	1	-	3
5.	13A04604	Electronic Measurements & Instrumentation	3	1	-	3
6.	13A04605 13A04606 13A04607	**Choice Based Credit Courses** 1. Telecommunication Switching Networks 2. Television and Video Engineering 3. Artificial Neural Networks and Fuzzy Systems	3	1		3
7.	13A04608	Digital Signal Processing Lab	-		3	2
8.	13A04609	Microprocessors & Microcontrollers Lab	-		3	2
9.	13A52502	Advanced Communication skills Lab (Audit course)			3	
10	13A04610	Comprehensive Online Examination	-	-	-	1
		Total	18	6	9	23

DIRECTOR
Academic & Planning
JNT University Anantapur,
Ananthapuramu-515 002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Course Structure Electronics and Communication Engineering

B. Tech Course
(2013-14)

IV B. Tech – I Sem

S.No.	Course Code	Subject	Theory	Tu	Lab	Credits
1	13A52702	Management Science	3	1	-	3
2	13A04701	VLSI Design	3	1	-	3
3	13A04702	Optical Fiber Communication	3	1	-	3
4	13A04703	Embedded Systems	3	1	-	3
5	13A04704 13A02605 13A04705	Theory-V (CBCC) -2 a. Digital Image Processing b. Neural Networks & Fuzzy Logic c. Spread Spectrum Techniques	3	1	-	3
6	13A04706 13A04707 13A04708	Theory-VI (CBCC) - 3 a. Wireless Communication b. Operating Systems c. Satellite communication	3	1	-	3
7	13A04709	VLSI & Embedded Systems Laboratory	-	-	4	2
8	13A04710	Microwave & Optical Communications Laboratory	-	-	4	2
		Total	**18**	**06**	**08**	**22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Course Structure Electronics and Communication Engineering

B. Tech Course
(2013-14)

IV B. Tech – II Sem

S.No.	Course Code	Subject	Theory	Tu	Lab	Credits
1	13A04801 13A04802	MOOC-I* a. Adaptive Signal Processing b. Advanced 3G & 4G wireless Communications	3	1	-	3
2	13A04803 13A04804	MOOC-II* a. Advanced Digital Signal Processing-Multirate & Wavelet b. RF integrated Circuits	3	1	-	3
3	13A04805 13A04806	MOOC-III* a. Pattern Recognition & Application b. Linux Programming & Scripting	3	1	-	3
4	13A04807	Technical Seminar	-	-	4	2
5	13A04808	Project Work	-	-	24	12
		Total	**09**	**03**	**28**	**23**

3 Theory + 1 Technical Seminar + 1 Project work

***Either by MOOCS manner or Self study or Conventional manner**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year	**Th**	**Tu**	**C**
	2	**0**	**3**

Common to All Branches

(13A52101) COMMUNICATIVE ENGLISH

Preamble:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of Engineering and Technology. The prescribed books serve the purpose of preparing them for everyday communication and to face global competitions in future.

The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.

The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some selected topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

Course Objective:

- *To enable the students to communicate in English for academic and social purpose.*
- *To enable the students to acquire structure and written expressions required for their profession.*
- *To develop the listening skills of the students.*
- *To inculcate the habit of reading for pleasure.*
- *To enhance the study skills of the students with emphasis on LSRW skills.*

Learning Outcome:

- *The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence.*

UNIT I

Chapter entitled 'Humour' from "Using English"

Chapter entitled 'Biography - (Homi Jehangir Bhabha)' from "New Horizons"

Listening - Techniques - Importance of phonetics

L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)

R- Reading Strategies -Skimming and Scanning

W- Writing strategies- sentence structures

G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis

V-Affixes-prefix and suffix, root words, derivatives

UNIT II

Chapter entitled 'Inspiration' from "Using English"

Chapter entitled 'Biography - (Jagadish Chandra Bose)' from "New Horizons"

L- Listening to details

S- Apologizing, Interrupting, Requesting and Making polite conversations

R- Note making strategies

W- Paragraph-types- topic sentences, unity, coherence, length , linking devices

G-Auxiliary verbs and question tags

V- synonyms-antonyms, homonyms, homophones, homographs, words often confused

UNIT III

Chapter entitled 'Sustainable Development' from "Using English"

Chapter entitled 'Short Story - (The Happy Prince)' from "New Horizons"

L- Listening to themes and note taking

S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising

R- Reading for details -1

W- Resume and cover letter

G- Tenses – Present tense, Past tense and Future tense

V-Word formation and One-Word Substitutes

UNIT IV

Chapter entitled 'Relationships' from "Using English"

Chapter entitled 'Poem - (IF by Rudyard Kipling)' from "New Horizons"

L- Listening to news

S- Narrating stories, Expressing ideas and opinions and telephone skills

R- Reading for specific details and Information

W- Technical Report writing-strategies, formats-types-technical report writing

G- Voice and Subject–Verb Agreement

V- Idioms and prepositional Phrases

UNIT V

Chapter entitled 'Science and Humanism' from "Using English"

Chapter entitled 'Autobiography - (My Struggle for an Education by Booker T.Washington)' from "New Horizons"

L- Listening to speeches

S- Making Presentations and Group Discussions

R- Reading for Information

W- E-mail drafting

G- Conditional clauses and conjunctions

V- Collocations and Technical Vocabulary and using words appropriately

Text Books:

1. ***Using English*** *published by Orient Black Swan.*
2. ***New Horizons*** *published by Pearson.*

Reference Books:

1. ***Raymond Murphy's English Grammar with CD,*** *Murphy, Cambridge University Press, 2012.*
2. ***English Conversation Practice*** *–Grant Taylor, Tata McGraw Hill, 2009.*
3. ***Communication Skills,*** *Sanjay Kumar & Pushpalatha Oxford University Press, 2012.*
4. ***A Course in Communication Skills****- Kiranmai Dutt & co. Foundation Books, 2012.*
5. ***Living English Structures****- William Standard Allen-Pearson, 2011.*
6. ***Current English Grammar and Usage,*** *S M Guptha, PHI, 2013.*
7. ***Modern English Grammar****-Krishna SWAMI,.McMillan, 2009.*
8. ***Powerful Vocabulary Builder****- Anjana Agarwal, New Age International Publishers, 2011.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year	**Th**	**Tu**	**C**
	2	**0**	**3**

Common to All Branches

(13A56101) ENGINEERING PHYSICS

Preamble:

There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. This helped to the discovery of new phenomena in macro, micro and nano scale device technologies. The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering.

To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of engineering physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like optics, crystallography, ultrasonics, quantum mechanics, free electron theory. Also new phenomenon, properties and device applications of semiconducting, magnetic, superconducting and nano materials along with their modern device applications have been introduced.

Course Objective:

- *To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.*
- *To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and also to understand different types of defects in crystals adnoun-destructive evaluation using ultrasonic techniques.*
- *To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.*
- *To open new avenues of knowledge and understanding on semiconductor based electronic devices, basic concepts and applications of semiconductor and magnetic materials have been introduced which find potential in the emerging micro device applications.*
- *To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in modern emerging technologies are elicited.*

Learning Outcome:

- *The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.*
- *The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.*
- *The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.*
- *The electronic and magnetic properties of materials were successfully explained by free electron theory and focused on the basis for the band theory.*
- *The properties and device applications of semiconducting and magnetic materials are illustrated.*

- *The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.*

UNIT 1

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

Physical Optics: Introduction - Interference in thin films by reflection – Newton's Rings – Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Introduction - Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients - Population inversion – Excitation mechanisms and optical resonator - Ruby laser - He-Ne laser – Applications of lasers.

Fibre optics: Introduction– Construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in fibers - Optical fiber communication system – Applications of optical fibers in communications, sensors and medicine.

UNIT II

CRYSTALLOGRAPHY AND ULTRASONICS:

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Structures of NaCl and Diamond – Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law –Laue and Powder methods – Defects in solids: point defects, line defects (qualitative) - screw and edge dislocation, burgers vector.

Ultrasonics: Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT III

QUANTUM MECHANICS AND FREE ELECTRON THEORY:

Quantum Mechanics: Introduction to matter waves – de'Broglie hypothesis - Heisenberg's uncertainty principle and its applications - Schrodinger's time independent and time dependent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well - Eigen values and Eigen functions.

Free electron theory: Classical free electron theory –- Sources of electrical resistance - Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution –Kronig-Penny model(qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT IV

SEMICONDUCTORS AND MAGNETIC MATERIALS:

Semiconductor Physics: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode, LED, laser diode and photodiode.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications.

UNIT V

SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS:

Superconductivity: Introduction – Meissner effect - Properties of superconductors – Type I and type II superconductors – Flux quantization – London penetration depth – ac and dc Josephson effects – BCS theory(qualitative) – High T_c superconductors - Applications of superconductors.

Physics of Nanomaterials**:** Introduction - Significance of nanoscale - Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball mill, chemical vapour deposition, sol-gel, plasma arcing and thermal evaporation – Properties of Carbon nanotubes – High strength applications – Properties of graphene – Graphene based Field Effect Transistor - Applications of nanomaterials.

Text Books:

1. Engineering physics – S. ManiNaidu, Pearson Education, I Edition, 2012.
2. Engineering Physics – V. Rajendran, MacGraw Hill Publishers, I Edition,2008.

Reference Books:

1. Engineering Physics – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers, III Edition, 2012.
2. Engineering Physics – RV.S.S.N. Ravi Kumar and N.V. Siva Krishna, Maruthi Publications , 2013
3. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish University Press, I Edition, 2009.
4. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning, I Edition, 2012
5. Engineering Physics – Hitendra K Mallik and AK Singh, McGraw Hill Education Pvt. Ltd, New Delhi , I Edition, 2010
6. Engineering Physics – M. Arumugam, Anuradha Publications II Edition, 1997.
7. Engineering physics – M.N. Avadhanulu and P.G. KshirSagar, Chand and Co, Revised Edition, 2013.
8. Solid State Physics – A.J. Dekkar, McMillan Publishers, Latest edition, 2012.
9. Engineering Physics – Gaur and Gupta Dhanapati, Rai Publishers , 7th Edition, 1992.
9. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.
10. Carbon Nanotubes and Graphene Device Physics – H.S. Philip Wong, Deji Akinwande, Cambridge University Press, 2011.

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B.Tech. I Year	**Th**	**Tu**	**C**
	2	**0**	**3**

Common to All Branches

(13A51101) ENGINEERING CHEMISTRY

Preamble:

Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering is depend on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical materials engineers are in search of proper conducting polymers, the mechanical engineers are on lookout for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

Course Objective:

- *The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.*
- *The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.*
- *The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.*
- *The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.*
- *After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, analytical methods, engineering materials and water chemistry.*

Learning Outcome:

The student is expected to:

- *Understand the electrochemical sources of energy*
- *Understand industrially based polymers, various engineering materials.*
- *Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.*

UNIT 1

ELECTROCHEMISTRY:

Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries). Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen).

Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples: analysis of Glucose and urea.

Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

UNIT II

POLYMERS:

Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordination covalent, Elastomers (rubbers), Natural Rubber, Compounding of Rubber,

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers. Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons.

Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline. Liquid Crystals: Introduction, classification and applications.

Inorganic Polymers: Basic Introduction, Silicones, Polyphospazins (-(R)2-P=N-) applications.

UNIT III

FUEL TECHNOLOGY:

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems, Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

Liquid Fuels: Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis.

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

UNIT IV

CHEMISTRY OF ENGINEERING MATERIALS:

Semiconducting and Super Conducting materials-Principles and some examples, Magnetic materials – Principles and some examples, Cement: Composition, Setting and Hardening (Hydration and Hydrolysis), Refractories: Classification, properties and applications, Lubricants: Theory of lubrication , properties of lubricants and applications, Rocket Propellants: Classification, Characteristics of good propellant

UNIT V

WATER TREATMENT:

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching powder, ozonisation)

Industrial Use of water: For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water: Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

Text Books:

1. *Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Fourth Edition, 2012.*
2. *A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.*

Reference Books:

1. *A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15th Edition, 2010.*
2. *Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.*
3. *Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.*

4. *Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.*
5. *Text Book of Engineering Chemistry, Shashichawla, Dhanapath Rai Publications, New Delhi, 4th Edition, 2011.*
6. *Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year	**Th**	**Tu**	**C**
	3	**1**	**5**

Common to All Branches

(13A54101) MATHEMATICS – I

Course Objective:

- *To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications in electrical circuits, deflection of beams, whirling of shafts.*
- *To prepare students for lifelong learning and successful careers using mathematical concepts of differential, Integral and vector calculus, ordinary differential equations and Laplace transforms.*
- *To develop the skill pertinent to the practice of the mathematical concepts including the student abilities to formulate the problems, to think creatively and to synthesize information.*

Learning Outcome:

- *The students become familiar with the application of differential, integral and vector calculus, ordinary differential equations and Laplace transforms to engineering problems.*
- *The students attain the abilities to use mathematical knowledge to analyze and solve problems in engineering applications.*

UNIT I

Exact, linear and Bernoulli equations, Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), method of variation of parameters. Applications to oscillatory electrical circuits, Deflection of Beams, whirling of shafts.

UNIT II

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involutes evolutes, envelopes.

UNIT III

Curve tracing – Cartesian, polar and parametric curves. Length of curves.

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes, surface area of solid of revolution in Cartesian and polar coordinates using double integral.

UNIT IV

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's – Stoke's and Gauss's Theorems.

Text Books:

1. *Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-42 Edition(2012)*
2. *Engineering Mathematics, Volume - I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher 1st Edition (2010)*

Reference Books:

1. *Engineering Mathematics Volume-I, by T.K.V. Iyengar, S.Chand publication-12th Edition(2013)*
2. *Engineering Mathematics, Volume - I, by G.S.S.Raju, CENGAGE publisher.(2013)*
3. *Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India-10thEdition(2012)*
4. *Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers(2008)*
5. *Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier-1st Edition(2001)*

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B.Tech. I Year	**Th**	**Tu**	**C**
	3	**1**	**5**

(13A12101) PROGRAMMING IN C & DATA STRUCTURES

Course Objective:

- *To make the student understand problem solving techniques*
- *Students will be able to understand the syntax and semantics of C programming language and other features of the language*
- *Get acquaintance with data structures, searching and sorting techniques*

Learning Outcome:

- *Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems*
- *Student can choose appropriate data structure and control structure depending on the problem to be solved*
- *Student can effectively use existing data structures and design new data structures appropriate to the problem to be solved*
- *Student can modularize the problem and also solution*
- *Student can use appropriate searching and sorting technique to suit the application.*

UNIT I

Introductory Concepts: Introduction to computers, What is a Computer, Block diagram of Computer, Computer Characteristics, Hardware Vs Software, How to develop a program, Software development life cycle, Structured programming, Modes of operation, Types of programming languages, Introduction to C, Desirable program characteristics.

Introduction to Computer problem solving: Introduction, The problem solving aspect, Top down design, Implementation of algorithms.

Introduction to C programming: The C character set, Writing first program of C, Identifiers and key words, A more useful C program, Entering the program into the computer, Compiling and executing the program, Data types, Constants, Variables and arrays, Declarations, Expressions, Statements, Symbolic Constants.

Operators and Expressions: Arithmetic operators, Unary operators, Relational and Logical operators, Assignment operators, Conditional operator, Library functions.

Fundamental algorithms: Exchanging the values of two variables, Factorial computation, Sine function computation, Reversing the digits of an integer, Generating prime numbers.

UNIT II

Data Input and Output: Preliminaries, Single character input-getchar function, Single character output-putchar function, Entering input data-the scanf function, More about the scanf function, Writing output data-The printf function, More about the printf function, The gets and puts functions, Interactive(conversational) programming.

Preparing and running a complete C program: Planning a C program, Writing a C program, Error diagnostics, Debugging techniques.

Control statements: Preliminaries, Branching: if-else statement, Looping: The while statement, More looping: The do-while statement, Still more looping: The for statement, Nested control structures, The switch statement, Break statement, Continue statement, The comma operator, The goto statement.

Functions: A brief overview, Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Recursion

UNIT III

Program Structure: Storage classes, Automatic variables, External (global) variables, Static variables, Multi file programs, More about library functions.

Arrays: Defining an array, Processing an array, Passing arrays to functions, Multi dimensional arrays.

Array Techniques: Array order reversal, Removal of duplicates from an ordered array, Finding the K^{th} smallest element.

Merging, Sorting and Searching: The two way merge, Sorting by selection, Sorting by exchange, Sorting by insertion, Sorting by partitioning, Recursive Quick sort, Binary Search.

Strings: Defining a string, NULL character, Initialization of strings, Reading and Writing a string, Processing the strings, Character arithmetic, Searching and Sorting of strings, Some more Library functions for strings

UNIT IV

Pointers: Fundamentals, Pointer Declarations, Passing pointer to a function, Pointers and one dimensional array, Dynamic memory allocation, Operations on pointers, Pointers and multi dimensional arrays, Arrays of pointers, Passing functions to other functions, More about pointer declarations.

Structures and Unions: Defining a structure, Processing a structure, User defined data type (typedef), Structures and Pointers, Passing structures to functions, Unions.

File Handling: Why files, Opening and closing a data file, Reading and Writing a data file, Processing a data file, Unformatted data files, Concept of binary files, Accessing the file randomly (using fseek).

Additional Features: Register variables, Bitwise operations, Bit Fields, Enumerations, Command line parameters, More about Library functions, Macros, The C Preprocessor

UNIT V

Introduction to Data Structures: Data abstraction

Stacks and Queues: Stacks, Stacks using dynamic arrays, Queues, Circular Queues using dynamic arrays

Evaluations of expressions: Expressions, Evaluating postfix expressions, Infix to Postfix, Multiple Stacks and Queues.

Linked Lists: Singly Linked lists and chains, Representing chains in C, Linked Stacks and Queues.

Text Books:

1. *"Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, Mc Graw Hill.*
2. *"Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.*
3. *"How to Solve it by Computer", R.G. Dromey, Pearson. (Pascal implementations may be considered without loss of generality or Instructors may replace them with C language programs)*

Reference Books:

1. *"Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education*
2. *"Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.*
3. *"Programming in C", Reema Thareja, Oxford Higher Education.*
4. *"Computer Fundamentals and C Programming", First Edition, Dr.P.Chenna Reddy, Available at: www.pothi.com.*
5. *"Data Structure and Program Design in C", Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.*
6. *"Programming with C", R.S. Bichkar, University Press.*
7. *"Computer Science A Structured Programming Approach Using C", Third Edition, Fourouzan & Gilberg, Cengage Learning.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. - I Year	**Th**	**Tu**	**C**
	3	**1**	**5**

(13A54102) MATHEMATICS – II

Course Objective:

- *This course aims at providing the student with the concepts of Matrices, Fourier series, Fourier and Z-transforms and partial differential equations which find the applications in engineering.*
- *Our emphasis will be more on logical and problem solving development in Numerical methods and their applications.*

Learning Outcome:

- *The student becomes familiar with the application of Mathematical techniques like Fourier series, Fourier and z-transforms.*
- *The student gains the knowledge to tackle the engineering problems using the concepts of Partial differential equations and Numerical methods.*

UNIT I

Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations

Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method.

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's Interpolation formula.

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT III

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods – Predictor-Corrector Method – Milne's Method. Numerical solution of Laplace equation using finite difference approximation.

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT IV

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

UNIT V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

Text Books:

1. *Higher Engineering Mathematics, B.S.Grewal, Khanna publishers- 42 Edition(2012)*
2. *Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher 5th Edition (2012)*

Reference Books:

1. *Engineering Mathematics, Volume - II, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher-1st Edition (2010)*
2. *Engineering Mathematics, Volume - II, by G.S.S.Raju, CENGAGE publisher – 1st Edition(2013)*
3. *Mathematical Methods by T.K.V. Iyengar, S. Chand publication-8th Edition(2013)*
4. *Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers (2008)*
5. *Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India 10th Edition (2013)*

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B.Tech. I Year	**Th**	**Tu**	**C**
	3	**1**	**5**

(13A04101) NETWORK ANANLYSIS

Course Objective:
To help students develop an understanding on analyzing electrical circuits using various techniques. To make the student familiarize with the fundamental concepts of coupled circuits, resonance, filters and to analyze the transient response in electric circuits.

Learning Outcome:
Upon completion of the course, students will be able to:

- *Solve the electrical network using mesh and nodal analysis by applying network theorems.*
- *Understand the basic concepts of coupled circuits, resonance and filters and solve problems.*
- *Analyze transient response in AC and DC electric circuits*

UNIT I
Circuit Analysis Techniques: Voltage and Current Laws, Basic Nodal and Mesh Analysis, Network Topology-Formation of Incidence Matrix, Tieset and Cutset Matrix formation, Network Theorems-Linearity and Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Milliman, Miller & Tellegan's Theorems. Source Transformation.

UNIT II
RL and RC Circuits: The Source free RL Circuit, The Source free RC Circuit, Properties of Exponential Response, Natural & Forced Response, RLC Circuits, Complete Response of Source free parallel RLC Circuits, Source free Series RLC Circuits.
Sinusoidal Steady State Analysis: Characteristics of Sinusoids, Forced Response of Sinusoidal Functions, The Complex forcing Function, The Phasor, Phasor relationships for R,L, and C, Impedance, Admittance.
A.C Circuit Power Analysis: Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power, Power Factor, Complex Power. **Circuit Analysis in S-Domain:** Z(S) and Y(S), Poles, Zeros and Transfer Functions, The Complex- Frequency Plane, Natural Response and the S-Plane.

UNIT III
Resonance: Introduction, Definition of 'quality factor **Q**' of inductor and capacitor, Series resonance, Bandwidth of the series resonant circuits, Parallel resonance (or anti-resonance), Conditions for maximum impedance, Currents in parallel resonance, Impedance variation with frequency; universal resonance curves, Bandwidth of parallel resonant circuits, General case of parallel resonance circuit, Anti-resonance at all frequencies, variable phase angle circuit, reactance curves, Impedance Transformation.
Magnetically Coupled Circuits: Mutual Inductance, Energy Considerations, The Linear Transformer, The Ideal Transformer

UNIT IV
Two Port Networks: Relationship of two port variables, Short circuit Admitance parameters, Open circuit Impedance parameters, Transmission Parameters, Hybrid Parameters, Relationship between parameter sets, Parallel connection of two port networks, State Variable Networks.
State Variable Analysis: Introduction to state variables – state variables of circuits, state and output equations, advantages of state variable analysis, Circuit state equations, Proper and improper circuits, Equations for proper circuits, Transform solution of state equations, Illustrative problems.

UNIT V

Filters: Introduction, the neper & decibel, Characteristic Impedance of symmetrical networks, Currents & voltage ratios as exponentials; the propagation constant, Hyperbolic trigonometry, Properties of symmetrical networks, Filter fundamentals; pass and stop bands, Behavior of characteristic impedance, The constant – k low pass filter, the constant – k high pass filter, The m-derived T section, The m-derived π section, Variation of characteristic impedance over the pass band, Termination with m-derived half sections, Band-pass filters, Band elimination filters, Illustrative problems.

Text Books:

1. *W H Hayt, J E Kemmerly and S M Durbin, "Engineering Circuit Analysis", Tata McGraw-Hill, 7th edition, 2010.*
2. *Van Valkenburg, "Network Analysis", PHI, 3rd Edition, 2011.*

Reference Books:

1. *John D. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition, 2012.*
2. *A. Sudhakar & Shyam Mohan S.Pillai "Circuits & Network Analysis & Synthesis", Tata McGraw Hill , 2nd Edition, 1994*
3. *Franklin F. Kuo, "Network Analysis and synthesis", Wiley India Pvt Ltd, 2nd Edition.*
4. *Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Sons, 2010.*
5. *K.Chenna Venkatesh, D.Ganesh Rao, "Network Analysis- A Simplified Approach ", Elsevier, 2nd Edition 2010*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year	**L**	**C**
	3	**4**

(13A12102) PROGRAMMING IN C & DATA STRUCTURES LAB

Course Objective:

- *To make the student learn C Programming language.*
- *To make the student solve problems, implement them using C language.*
- *To strengthen the ability to identify and apply the suitable data structure for the given real world problem.*

Learning Outcome:

- *Apply problem solving techniques to find solutions to problems.*
- *Able to use C language features effectively and implement solutions using C language.*
- *Be capable to identity the appropriate data structure for a given problem or application.*
- *Improve logical skills.*

LIST OF EXPERIMENTS/TASKS

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to 'n' terms e $^{x}=1+x+x^2/2!+x^3/3!+x^4/4!+$--------
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.
    i. Find the sum of Diagonal Elements of a matrix.
    ii. Print Transpose of a matrix.
    iii. Print sum of even and odd numbers in a given matrix.
19. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
21. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.

22. Write a program to split a 'file' in to two files, say file1 and file2. Read lines into the 'file' from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.
25. Write a program to read a set of strings and sort them in alphabetical order.
26. Write a program to sort the elements of an array using sorting by exchange.
27. Write a program to sort the elements of an array using Selection Sort.
28. Write a program to perform Linear Search on the elements of a given array.
29. Write a program to perform Binary Search on the elements of a given array.
30. Write a program to find the number of occurrences of each number in a given array of numbers.
31. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    i. String length determination ii .Compare Two Strings
    iii. Concatenate them, if they are not equal iv. String reversing
32. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.
33. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
34. Write a program to exchange two numbers using pointers.
35. Write a program to implement stack, queue, circular queue using array and linked lists.
36. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list
37. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
38. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
39. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
40. Write a program to find the square root of a number without using built-in library function.
41. Write a program to convert from string to number.
42. Write a program to generate pseudo random generator.
43. Write a program to remove duplicates from ordered and unordered arrays.
44. Write a program to sort numbers using insertion sort.
45. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
46. Write a program to search a word in a given file and display all its positions.
47. Write a program to generate multiplication tables from 11 to 20.
48. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
49. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
50. Write a program for tic-tac-toe game.
51. Write a program to find the execution time of a program.
52. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

***Note**: The above list consists of only sample programs. Instructors may choose other programs to illustrate certain concepts, wherever is necessary. Programs should be there on all the concepts studied in the Theory on C programming and Data structures. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.*

References:

1. *"Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, Mc Graw Hill.*
2. *"Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.*
3. *"How to Solve it by Computer", R.G. Dromey, Pearson.*
4. *"The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, Pearson.*
5. *"Classic Data Structures", Samantha, PHI*
6. *"Let us C", Yeswant Kanetkar, BPB publications*
7. *"Pointers in C", Yeswant Kanetkar, BPB publications*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year	**L**	**C**
	3	**4**

Common to All Branches
(13A99102) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed:

1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's Rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Meldes experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Determination of thermistor coefficients (α, β)
14. Hall effect : Determination of mobility of charge carriers in semiconductor
15. B-H curve
16. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
17. Determination of lattice constant using X-ray spectrum.

ENGINEERING CHEMISTRY LAB

Preamble:
The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have feel good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.

***Course Objective**:*

- *Will learn practical understanding of the redox reaction*
- *Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention*
- *Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications*
- *Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology*

Learning Outcome:

- *Would be confident in handling energy storage systems and would be able combat chemical corrosion*

- *Would have acquired the practical skill to handle the analytical methods with confidence.*
- *Would feel comfortable to think of design materials with the requisite properties*
- *Would be in a position to technically address the water related problems.*

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed:

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Copper by Iodometry
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromite indicator (Mohrs method)

References:

1. *Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.*
2. *Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year **L C**
3 4

Common to All Branches
(13A99103) ENGINEERING & I.T. WORKSHOP

ENGINEERING WORKSHOP

Course Objective:
The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students

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 out of 300 x 40 x 25 mm soft wood stock
b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail 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 guage G.I. sheet
d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a 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. *Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e Vikas*
4. *Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.*

I.T. WORKSHOP

Course Objective:

- *To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations*
- *To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system*
- *To learn about Networking of computers and use Internet facility for Browsing and Searching.*

Learning Outcome:

- *Disassemble and Assemble a Personal Computer and prepare the computer ready to use.*
- *Prepare the Documents using Word processors*
- *Prepare Slide presentations using the presentation tool*
- *Interconnect two or more computers for information sharing*
- *Access the Internet and Browse it to obtain the required information*
- *Install single or dual operating systems on computer*

Preparing your Computer (5 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet (4 weeks)

Task 5: 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.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools (6 weeks)

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the color, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: 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 10: 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.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB

- CAD/CAM software
- AUTOCAD

References:

1. *Introduction to Computers, Peter Norton, Mc Graw Hill*
2. *MOS study guide for word, Excel, Powerpoint & 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 & Repairing PCs", Bigelows, TMH*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year	**L**	**C**
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Common to All Branches
(13A52102) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Course Objective:

- *To train students to use language effectively in everyday conversations.*
- *To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.*
- *To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.*
- *To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence*
- *To train students to use language appropriately for interviews, group discussion and public speaking*

Learning Outcome:

- *Becoming active participants in the learning process and acquiring proficiency in spoken English of the students*
- *Speaking with clarity and confidence thereby enhancing employability skills of the students*

PHONETICS
Importance of speaking phonetically correct English
Speech mechanism-Organs of speech
Uttering letters-Production of vowels sounds
Uttering letters -Production of consonant sounds
Uttering words-Stress on words and stress rules
Uttering sentences-Intonation-tone group

LISTENING
Listening as a skill
Listening activities

PRESENTATIONAL SKILLS
Preparation
Prepared speech
Impromptu speech
topic originative techniques
JAM (Just A Minute)
Describing people/object/place
Presentation-
Stage dynamics
Body language

SPEAKING SKILLS
Telephone skills
Role plays
Public Speaking

GROUP ACTIVITIES
Debates
Situational dialogues

MINIMUM REQUIREMENT FOR ELCS LAB:
The English Language Lab shall have two parts:

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.
- 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:
  - P – IV Processor
  - Speed – 2.8 GHZ
  - RAM – 512 MB Minimum
  - Hard Disk – 80 GB
  - Headphones of High quality

SUGGESTED SOFTWARE:

- Clarity Pronunciation Power – Part I (Sky Pronunciation)
- Clarity Pronunciation Power – part II
- K-Van Advanced Communication Skills
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- *DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.*
- Lingua TOEFL CBT Insider, by Dreamtech
- English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
- Cambridge Advanced Learners' English Dictionary with CD.
- Oxford Advanced Learner's Compass, 8th Edition
- Communication Skills, Sanjay Kumar & Pushp Lata. 2011. OUP

References:

1. *Strengthen Your Steps, Maruthi Publicaions, 2012.*
2. *A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd.*
3. *A Textbook of English Phonetics for Indian Students 2nd Ed T. Balasubramanian. (Macmillian),2012.*
4. *Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).*
5. *Listening in the Language Classroom, John Field (Cambridge Language Teaching Library),2011*
6. *A Hand Book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011*
7. *English Pronunciation in Use. Intermediate & Advanced, Hancock, M. 2009. CUP.*
8. *Basics of Communication in English, Soundararaj, Francis. 2012.. New Delhi: Macmillan*
9. *Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.*
10. *English Pronouncing Dictionary, Daniel Jones, Current Edition with CD.Cambridge, 17th edition, 2011.*

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B.Tech. II - I Sem.	**Th**	**Tu**	**C**
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(13A54302) MATHEMATICS – III

Course Objective:

- *To enable the students to understand the mathematical concepts of special functions & complex variables and their applications in science and engineering.*

Learning Outcome:

- *The student achieves the knowledge to analysis the problems using the methods of special functions and complex variables.*

UNIT I

Special Functions: Gamma and Beta Functions – their properties – Evaluation of improper integrals. Series Solutions of ordinary differential equations (Power series and Frobenius Method).

UNIT II

Bessel functions – Properties – Recurrence relations – Orthogonality. Legendre polynomials – Properties – Rodrigue's formula – Recurrence relations – Orthogonality.

UNIT III

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

Conformal mapping: Transformation of e^z, Inz, z^2, Sin z, cos z, Bilinear transformation - Translation, rotation, magnification and inversion – Fixed point – Cross ratio – Determination of bilinear transformation.

UNIT IV

Complex integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point – Isolated singular point – Pole of order m – Essential singularity.

UNIT V

Residue – Evaluation of residue by formula and by Laurent series – Residue theorem.
Evaluation of integrals of the type

(a) improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$

(c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

Text Books:

1. *Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.*
2. *Advanced Engineering Mathematics, Peter V.O'Neil, CENGAGE publisher.*

Reference Books:

1. *Mathematics III by T.K.V. Iyengar, S.Chand publications.*
2. *Engineering Mathematics, Volume - III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.*
3. *Complex variables by Raisinghania*
4. *Advanced Engineering Mathematics by M.C. Potter, J.L. Goldberg, Edward F.Aboufadel, and Oxford.*

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B.Tech. II - I Sem.	Th	Tu	C
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(13A04301) ELECTRONIC DEVICES AND CIRCUITS

Course Objective:

- *To give understanding on semiconductor physics of the intrinsic, p and n materials, characteristics of the p-n junction diode, diode's application in electronic circuits, Characteristics of BJT,FET,MOSFET, characteristics of special purpose electronic devices.*
- *To familiarize students with DC biasing circuits of BJT, FET and analyzing basic transistor amplifier circuits.*

Learning Outcome:

Upon completion of the course, students will:

- *Analyze the operating principles of major electronic devices, its characteristics and applications.*
- *Design and analyze the DC bias circuitry of BJT and FET.*
- *Design and analyze basic transistor amplifier circuits using BJT and FET.*

UNIT I

PN JUNCTION DIODE & ITS APPLICATIONS:

Review of semi conductor Physics n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level in intrinsic and extrinsic semiconductors, PN Diode Equation, Volt-Ampere (V-I) Characteristics, Temperature Dependence of V-I Characteristics, Ideal Versus Practical Static and Dynamic Resistances, Diode Equivalent circuits, Break down Mechanisms in semiconductor Diodes, Zener Diode Characteristics. PN Junction as a Rectifier, Half wave rectifier, ripple factor, full wave rectifier, Bridge Rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, π- section filter, Use of Zener Diode as a Regulator, Illustrative problems.

UNIT II

TRANSISTOR AND FET CHARECTERISTICS: Transistor construction, BJT Operation, BJT Symbol, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications, The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol) - Pinch-Off Voltage – Volt-Ampere Characteristics, FET as Voltage Variable Resistor, Comparison between BJT and FET, MOSFET- Basic Concepts, Construction, modes(depletion & enhancement), symbol, principle of operation, characteristics.

UNIT III

BIASING AND STABILISATION: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self Bias, Bias Stability, Stabilization against Variations in $I_{CO,}$ V_{BE} and β, Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Biasing of FET – Source self bias, Biasing for zero current Drift, Biasing against Devices variation, Illustrative problems.

UNIT IV

SMALL SIGNAL ANALYSIS OF AMPLIFIERS (BJT & FET):

BJT Modeling using h-parameters, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Millers Theorem, Dual of Millers Theorem. Small Signal Model of JFET & MOSFET ,Small signal analysis of Common Source, and Common Drain Amplifiers using FET, Illustrative problems.

UNIT V

SPECIAL PURPOSE ELECTRONIC DEVICES:

Principle of Operation, and Characteristics of Tunnel Diode, Varactor Diode, Schottky Barrier Diode, Silicon Control Rectifier, Diac, Triac & Uni-Junction Transistor (UJT),Semiconductor photo devices - LDR, LED, Photo diodes & Photo transistors.

Text Books:

1. J.Millman and Christos.C.Halkias, Satyabrata, "Electronic Devices and Circuits", TMH Third edition, 2012,

2. K .Lal kishore, "Electronic Devices and Circuits", BSP. 2nd edition, 2005,

Reference Books:

1. R.L. Boylestad, "Introductory Circuit Analysis", PEARSON,12th edition, 2013

2. B.P.Singh and Rekha Singh, "Electronic Devices and Circuits", PEARSON, 2nd Edition2013.

3. David A. Bell, "Electronic Devices and Circuits", Oxford University press ,5th Edition, 2008,.

4. Mohammad H.Rashid, "Electronic Devices and Circuits", CENGAGE Learning

5. N.Salivahanan, and N.Suresh Kumar, "Electronic Devices and Circuits", TMH ,3rd Edition, 2012

6. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", Oxford University Press, 5th Ed.

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(13A04302) SIGNALS AND SYSTEMS

Course *Objective*:

- *To study about signals and systems.*
- *To do analysis of signals & systems (continuous and discrete) using time domain & frequency domain methods.*
- *To understand the stability of systems through the concept of ROC.*
- *To know various transform techniques in the analysis of signals and systems.*

***Learning Outcome*:**

- *For integro-differential equations, the students will have the knowledge to make use of Laplace transforms.*
- *For continuous time signals the students will make use of Fourier transform and Fourier series.*
- *For discrete time signals the students will make use of Z transforms.*
- *The concept of convolution is useful for analysis in the areas of linear systems and communication theory.*

UNIT I

Signals and Systems: Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, the Unit Impulse and Unit Step Functions, Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems, The Convolution Sum, Continuous-Time LTI Systems - The Convolution Integral, Properties of Linear Time-Invariant Systems, Causal LTI Systems Described by Differential and Difference Equations, Singularity Functions.

UNIT II

Fourier Series Representation of Periodic Signals: The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous-Time Periodic Signals, Convergence of the Fourier Series, Properties of Continuous-Time Fourier Series, Fourier Series Representation of Discrete-Time Periodic Signals, Properties of Discrete-Time Fourier Series, Fourier Series and LTI Systems, Filtering - Examples of Continuous-Time Filters Described by Differential Equations, Examples of Discrete-Time Filters Described by Difference Equations.

UNIT III

The Continuous-Time Fourier Transform: Representation of Aperiodic Signals, The Continuous-Time Fourier Transform, The Fourier Transform for Periodic Signals, Properties of the Continuous-Time Fourier Transform, The Convolution Property, Fourier Properties and Basic Fourier Transform Pairs, Systems characterized by Linear constant coefficient differential equations, The Discrete-Time Fourier Transform - Representation of Aperiodic Signals, The Discrete-Time Fourier Transform, The Convolution Property, Fourier Transform Properties and Basic Fourier Transform Pairs, Duality, Systems Characterized by Linear Constant-Coefficient Difference Equations.

UNIT IV

Time & Frequency Characterization of Signals and Systems: The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems, Time-Domain Properties of Ideal Frequency-Selective Filters, Time-Domain and Frequency-Domain Aspects of Non-ideal Filters, First-Order and Second-Order

Continuous-Time Systems, First-Order and Second-Order Discrete-Time Systems, Examples of Time- and Frequency-Domain Analysis of Systems,

Sampling: Representation of a Continuous-Time Signal by Its Samples - Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation. Effect of under sampling: Aliasing, Discrete-Time Processing of Continuous-Time Signals.

UNIT V

Laplace and z-Transforms: The Laplace Transform. The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform, System Function Algebra and Block Diagram Representations, Unilateral Laplace Transform, The Z-Transform - Region of Convergence for the z-Transform, The Inverse z-Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the z-Transform, Some Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms, System Function Algebra and Block Diagram Representations, Unilateral z-Transforms.

Text Books:

1. *Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, "Signals and Systems," Pearson Higher Education, 2nd Ed., 1997.*
2. *B.P. Lathi, "Principles of LINEAR SYSTEMS and SIGNALS," Oxford Univ. Press, Second Edition International version, 2009.*

Reference Books:

1. *Simon Haykin and B. Van Veen, "Signals & Systems," John Wiley, 2nd Edition, 2003.*
2. *M. E. Van Valkenburg, Network Analysis,PHI Publications, 3rdEdition , 2000.*
3. *Luis F. Chaparro, "Signals and Systems using MATLAB," Academic Press, 2011.*
4. *Narayana Iyer, "Signals and Systems,"CENGAGE Learning, 2011.*
5. *Michel J. Robert, "Fundamentals of Signals and Systems," MGH International Edition, 2008.*
6. *C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms," Pearson education, 4th Edition, 2008.*

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B.Tech. II – I Sem.	**Th**	**Tu**	**C**
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(13A04303) SWITCHING THEORY AND LOGIC DESIGN

Course Objective:

- *To provide fundamental concepts used in the design of digital systems and learn the methods for the design of digital circuits.*

Learning Outcome*:*

- *To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions*
- *To illustrate the concepts and study the procedures for the analysis and design of combinational circuits and sequential circuits*
- *To introduce the concepts of programmable logic devices.*

UNIT I
NUMBER SYSTEM & BOOLEAN ALGEBRA
Digital systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, Other logic operations & Logic gates.

UNIT II
GATE LEVEL MINIMIZATION
The map method, four variable, K-map, Five variable map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III
ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS:
Combinational circuits, Analysis & Design procedure, Binary Adder-subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV
ANALYSIS AND SYNTHESIS OF SEQUNTIAL CIRCUITS:
Sequential Circuits, Latches Flips-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, other counters.

UNIT V
Asynchronous sequential Logic & Programmable Memories
Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards. Random Access Memory, Memory Decoding Error detection and correction, ROM,PLA, PAL.

Text Books:

1. M.Morris Mano & Michel D. Ciletti, "Digital Design" ,Pearson ,5th Edition.
2. Zvi Kohavi and Nirah K.Jha, "Switching theory and Finite Automata Theory" ,Cambridge,3rd Edition

Reference Books:

1. Subratha Goshal, "Digital Electronics", Cambridge.
2. Comer, "Digital & State Machine Design", Third Indian edition, OXFORD.

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B.Tech. II – I Sem.	**Th**	**Tu**	**C**
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(13A04304) PROBABILITY THEORY & STOCHASTIC PROCESSES

Course Objective:

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

Learning Outcome:

- *A student will 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, Bays' 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 Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, 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. *Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", TMH, 4th Edition, 2001.*
2. *Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", PHI, 4th Edition, 2002.*

Reference Books:

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

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B.Tech. II - I Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A02303) ELECTRICAL TECHNOLOGY

Course Objective:

- *This course introduces the concepts of three phase circuits and basics of the DC and AC Machines which facilitates to study of the performance of Generators, motors, Transformers etc.*

UNIT I
THREE PHASE CIRCUITS

Phase Sequence- Star and Delta Connection-Relation Between Line and Phase Voltages and Currents in Balanced Systems-Analysis of Balanced Three Phase Circuits- Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems. Analysis of Three Phase Unbalanced Circuits-Loop Method- Application of Millman's Theorem- Star Delta Transformation Technique – Two Wattmeter Method of Measurement of Three Phase Power.

UNIT II
DC MACHINES

DC Generators : Principle of Operation of DC Machines, EMF Equation, Types of Generators, Magnetization and Load Characteristics of DC Generators.

DC Motors : DC Motors, Types of Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test, Speed Control of DC Shunt Motor, Flux and Armature Voltage Control Methods.

UNIT III
TRANSFORMERS

Principle of Operation of Single Phase Transformers-Types - Constructional Details. Emf Equation - Operation on No Load and On Load - Phasor Diagrams. Equivalent Circuit, Losses and Efficiency, Regulation. OC and SC Tests - Predetermination of Efficiency and Regulation (Simple Problems)

UNIT IV
3-PHASE INDUCTION MOTORS

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines-Production of a Rotating Magnetic Field - Principle of Operation – Slip - Rotor Emf and Rotor Frequency - Rotor Reactance, Rotor Current and Pf at Standstill and During Operation. Torque Equation- - Expressions for Maximum Torque and Starting Torque - Torque Slip Characteristic

UNIT V
SYNCHRONOUS GENERATORS

Principle And Constructional Features of Salient Pole and Round Rotor Machines – Pitch, Distribution, Winding Factors – E.M.F Equation- Synchronous Reactance and Impedance – Experimental Determination – Phasor Diagram – Load Characteristics. Voltage Regulation Methods – E.M.F Method.

Text Books:

1. *Basic Electrical Engineering by D P KOTHARI & I J NAGRATH, Tata McGraw Hill, Second Edition, 2007.*
2. *Electrical Circuit Theory and Technology by JOHN BIRD, Routledge publisher, 4Th Edition, 2011.*

Reference Books:

1. *Electrical & Electronic Technology by Edward Hughes, 10th Edition, Pearson, 2008.*

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B.Tech. II - I Sem. **L** **C**
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(13A02304) ELECTRICAL ENGINEERING LAB

PART-A

1. Verification of KVL And KCL.
2. Serial and Parallel Resonance – Timing, Resonant Frequency, Bandwidth and Q-Factor Determination for RLC Network.
3. Time Response of First Order RC/RL Network for Periodic Non-Sinusoidal Inputs – Time Constant and Steady State Error Determination.
4. Two Port Network Parameters – Z-Y Parameters, Chain Matrix and Analytical Verification.
5. Two Port Network Parameters – ABCD and H-Parameters.
6. Verification of Superposition and Reciprocity Theorems.
7. Verification of Maximum Power Transfer Theorem. Verification on DC, Verification on AC with Resistive and Reactive Loads.
8. Experimental Determination of Thevenin's and Norton's Equivalent Circuits and Verification by Direct Test.
9. Constant – K Low Pass Filter and High Pass Filter

PART-B

1. Magnetization Characteristics of D.C.Shunt Generator. Determination of Critical Field Resistance.
2. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
3. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
4. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors and Determination of Equivalent Circuit).
5. Load Test on Single Phase Transformer.

Note: Any 12 of the above Experiments are to be conducted

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem. **L C**
3 2

(13A04305) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Objective:

- *This Lab provides the students to get an electrical model for various semiconducter devices. Students can find and plot V_I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier*

Learning Outcome:

- *Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices*

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments
(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias & Reverse bias)
   Part B: Silicon Diode (Forward bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode act as a Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
   Part A: Drain (Output) Characteristics
   Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters

5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

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B.Tech. II - I Sem. **Th** **2**

(13A52301) HUMAN VALUES & PROFESSIONAL ETHICS (AUDIT COURSE)

Course Objective:

This course deals with professional ethics which includes moral issues and virtues, social responsibilities of an engineer, right, qualities of Moral Leadership.

UNIT I

ENGINEERING ETHICS

Senses of 'Engineering Ethics' – Variety of Moral Issues – Types of Inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's Theory – Gilligan's Theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

UNIT II

ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as Experimentation – Engineers as Responsible Experimenters – Research Ethics – Codes of Ethics – Industrial Standards – A Balanced Outlook on Law – The Challenger Case Study

UNIT III

ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk – Chernobyl Case Studies and Bhopal

UNIT IV

RESPONSIBILITIES AND RIGHTS

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality– Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights –Intellectual Property Rights (IPR) – Discrimination

UNIT V

GLOBAL ISSUES

Multinational Corporations – Business Ethics – Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty –Moral Leadership – Sample Code of Conduct

Text Books:

1. *Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York 2005.*
2. *Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.*

Reference Books:

1. *Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.*
2. *John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003.*
3. *Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.*
4. *Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.*
5. *David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, 2003.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A01403) ENVIRONMENTAL SCIENCE

Course Objective:

- *To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.*

UNIT I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest 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, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II

ECOSYSTEMS: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological sucession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION: Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-soports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

SOLID WASTE MANAGEMENT: Causes**,** effects and control measures of urban and industrial wates – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Proggramme. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc.

***Text Books**:*

1. *Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press, 2005.*
2. *Environmental Studies by Palanisamy, Pearson education, 2012.*
3. *Environmental Studies by R.Rajagopalan, Oxford University Press, 2nd edition, 2011.*

Reference Books:

1. *Textbook of Environmental Studies by Deeksha Dave and E.Sai Baba Reddy, Cengage Pubilications, 2nd edition, 2012.*
2. *Text book of Environmental Science and Technology by M.Anji Reddy, BS Publication, 2009.*
3. *Comprehensive Environmental studies by J.P.Sharma, Laxmi publications, 2nd edition, 2006.*
4. *Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited, 2nd edition, 1996.*
5. *Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited, 3rd edition, 2007.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04401) PULSE AND DIGITAL CIRCUITS

Course Objective:

- *To study various wave shaping circuits and their applications.*
- *To study different circuits that produce non-sinusoidal waveforms(multivibrators) and their applications*
- *To study various voltage time base generators and their applications.*
- *To study different logic families and their comparison.*

Learning Outcome:

- *Students will be able to design different pulse circuits based on the above concepts.*

UNIT I
LINEAR WAVESHAPING
High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. High Pass RC network as Differentiator, Low Pass RC network as integrator, attenuators and its applications as a CRO probe, RL circuits and its response for step input, Illustrative Problem .

UNIT II
NON-LINEAR WAVE SHAPING
Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, applications of voltage comparators, clamping operation, clamping circuits taking source and Diode resistances into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Synchronized Clamping.

UNIT III
MULTIVIBRATORS
Transistor as a switch, Break down voltages, Transistor-Switching Times, Triggering circuits. Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger circuit using BJT.

UNIT IV
TIME BASE GENERATORS
General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Transistor Current time base generators, Methods of linearity Improvements.

SYNCHRONIZATION AND FREQUENCY DIVISION
Pulse Synchronization of relaxation Devices, Frequency division in sweep circuit, Stability of relaxation Devices, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

UNIT V
SAMPLING GATES
Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Four Diode Sampling Gate, Reduction of pedestal in gate circuits, Six Diode Gate, Application of Sampling Gates.
Digital Logic Circuits: AND, OR, & NOT gates using Diodes, and Transistors, Analysis of DCTL, RTL, DTL, TTL, ECL and CMOS Logic Families, and comparison between the logic families.

Text Books:

1. J.Millman, H.Taub and Mothiki S. Prakash Rao, " Pulse, Digital and Switching Waveforms" ,TMH ,2nd Edition, 2008.

2. David A. Bell, "Solid State Pulse Circuits", PHI, 4th edition, 2002.

Reference Books:

1. Jacob Millman, Christos C. Halkias, "Integrated electronics" Tata McGraw Hill Publication

2. A. Anand Kumar, "Pulse and Digital Circuits", PHI, 2005.

3. Ronald J. Tocci, "Fundamentals of Pulse and Digital Circuits", 3rd edition, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04402) ELECTRONIC CIRCUITS ANALYSIS & DESIGN

Course Objective:

- *The aim of this course is to familiarize the student with the analysis and design of multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers .To study and analyze the frequency response of amplifier circuits.*

Learning Outcome:

Upon completion of this course, student will be able to :

- *Analyze the frequency response of the BJT amplifiers at low and high frequencies.*
- *Analyze and design multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.*

UNIT I

MULTISTAGE AMPLIFIERS.

Classification of Amplifiers- Distortion in amplifiers, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Different Coupling Schemes used in Amplifiers- RC Coupled Amplifier, Direct and Transformer Coupled Amplifiers, Design of Single stage RC Coupled Amplifier Using BJT, Analysis of Cascaded RC Coupled BJT Amplifiers, Darlington Pair, Cascode Amplifier, Illustrative design problems.

UNIT II

FREQUENCY RESPONSE

Logarithms, Decibels, General Frequency considerations, Frequency Response of BJT Amplifier, Analysis at Low and High Frequencies, Effect of Coupling and bypass Capacitors, The Hybrid-pi (π)-Common Emitter Transistor Model, CE short Circuit Current gain, Current gain with Resistive Load, Single Stage CE Transistor Amplifier response, Gain-Bandwidth Product, Emitter follower at higher frequencies, Illustrative design problems.

UNIT III

ANALYSIS AND DESIGN OF FEEDBACK AMPLIFIERS AND OSCILLATORS

Concepts of Feedback, Classification of Feedback Amplifiers, General Characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative design Problems.

Conditions for Oscillations, RC and LC type Oscillators, RC-Phase shift and Wien-Bridge Oscillators, Generalized Analysis of LC Oscillators, Hartley and Colpitts Oscillators, Crystal Oscillators, Frequency and Amplitude Stability of Oscillators, Illustrative design problems.

UNIT IV

POWER AMPLIFIERS

Classification, Series fed Class A Power Amplifier, Transformer Coupled Class A Amplifier, Efficiency, Push Pull Amplifier- Complementary Symmetry Class-B Power Amplifier, Amplifier Distortion, Power Transistor Heat sinking, Class C and Class D Power amplifiers, Illustrative design problems.

UNIT V

TUNED AMPLIFIERS

Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers , Illustrative design problems.

Text Books:

1. *Jacob Millman, Christos C Halkias, "Integrated Electronics", Mc Grawhill.*
2. *K.Lal Kishore, "Electronic Circuit Analysis", BSP,Second Edition.*

Reference Books:

1. *Robert L.Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory",Pearson Education, 9th edition, 2008*
2. *Donald A Neamen, "Electronic Circuits Analysis and Design", Tata McGraw-Hill,Third Edition, 2009.*
3. *sedra, Kenneth, Smith, "Microelectric circuits", Oxford University Press, 5th edition, 2011.*
4. *Mohammad H. Rashid, "Electronic Circuit and Applications" CENGAGE Learning.*
5. *Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education,7th edition, 2009,*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04403) ELECTROMAGNETIC THEORY & TRANSMISSION LINES

Course Objective:

- *Understanding and the ability to use vector algebra, and vector calculus.*
- *Proficiency in the use of vector identities, and various Coordinate systems & transformations.*

Learning Outcome:

This course provides the foundational education in static electromagnetic fields, and time varying electromagnetic waves. Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:

- *Analyze and solve the problems of electric and magnetic fields that vary with three dimensional spatial co-ordinates as well as with time.*
- *Become proficient with analytical skills for understanding propagation of electromagnetic waves in different media.*
- *Understand the concept of transmission lines & their applications.*
- *Develop technical & writing skills important for effective communication.*
- *Acquire team-work skills for working effectively in groups.*

UNIT I

Electrostatics: Review of Vector algebra, Co-ordinate systems & transformation, Vector calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Electric dipole, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT II

Magnetostatics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic torque and moment, Magnetic dipole, Inductances and Magnetic Energy, Illustrative Problems.

UNIT III

Maxwell's Equations (for Time Varying Fields): Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT IV

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector, and Poynting Theorem – Applications, Power Loss in a Plane Conductor, Illustrative Problems.

UNIT-V

Transmission Lines: Types, Transmission line parameters (Primary and Secondary), Transmission line equations, Input impedance, Standing wave ratio & power, Smith chart & its applications, Applications of transmission lines of various lengths, Micro-strip transmission lines – input impedance, Illustrative Problems.

Text Books:

1. *Matthew N.O. Sadiku, "Elements of Electromagnetics," Oxford Univ. Press, 4th ed., 2008.*
2. *William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics," TMH, 7th ed., 2006.*

Reference Books:

1. *E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems"PHI, 2nd Ed., 2000.*
2. *John D. Krauss, "Electromagnetics", McGraw- Hill publications, 3rd ed., 1988.*
3. *John D. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition, 2012.*
4. *Schaum's out – lines, "Electromagnetics,", Tata McGraw-Hill publications, Second Edition ,2006.*
5. *G. S. N. Raju, "Electromagnetic Field Theory and Transmission Lines," Pearson Education, 2013*
6. *N. Narayana Rao, "Fundamentals of Electromagnetics for Engineering," Pearson Edu. 2009.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.	**Th**	**Drg**	**C**
	1	**3**	**3**

(13A03304) ENGINEERING GRAPHICS

Course Objective:

- *By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.*
- *This course develops the engineering imagination i.e., so essential to a successful design, By learning techniques of engineering drawing changes the way one things about technical images.*
- *It is ideal to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Engineering Drawing is the language of engineers, by studying this course engineering and technology students will eventually be able to prepare drawings of various objects being used in technology.*

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance-Conventions in Drawing-Lettering – BIS Conventions. Curves used in Engineering Practice.

a) Conic Sections including the Rectangular Hyperbola- General method only,
b) Cycloid, Epicycloid and Hypocycloid

UNIT II

Projection of Points & Lines: Principles of orthographic projection – Convention – First angle projections, projections of points, lines inclined to one or both planes, Problems on projections, Finding True lengths.

UNIT III

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to one plane.
Projections of Solids: Projections of Regular Solids with axis inclined to one plane.

UNIT IV

Sections and Developments of Solids: Section Planes and Sectional View of Right Regular Solids-Prism, cylinder, Pyramid and Cone. True shapes of the sections. Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale-Isometric Views- Conventions- Isometric Views of lines, Planes Figures, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books*:*

1. *Engineering Drawing, N.D. Bhatt, Charotar Publishers*
2. *Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai*

Reference Books*:*

1. *Engineering Drawing, Johle, Tata McGraw-Hill Publishers*
2. *Engineering Drawing, Shah and Rana,2/e, Pearson Education*
3. *Engineering Drawing and Graphics, Venugopal/New age Publishers*
4. *Engineering Graphics, K.C. John, PHI,2013*
5. *Engineering Drawing, B.V.R. Guptha, J.K. Publishers*

Suggestions:

1. *Student is expected to buy a book mentioned under 'Text books' for better understanding.*
2. *Students can find the applications of various conics in engineering and application of involute on gear teeth. The introduction for drawing can be had on line from:*
    - *Introduction to engineering drawing with tools – youtube*
    - *Http-sewor. Carleton.ca /- g kardos/88403/drawing/drawings.html*
    - *Conic sections-online. red woods.edu*

The skill acquired by the student in this subject is very useful in conveying his ideas to the layman easily.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04404) ANALOG COMMUNICATION SYSTEMS

Course Objective*:*

- *To study the fundamental concept of the analog communication systems.*
- *To analyze various analog modulation and demodulation techniques.*
- *To know the working of various transmitters and receivers.*
- *To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.*

Learning Outcome*:*

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

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

UNIT I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Quadrature amplitude modulation (QAM), Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Carrier Acquisition- phased locked loop (PLL), Costas loop, Frequency division multiplexing (FDM), and Super-heterodyne AM receiver, 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, Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves –

Indirect method, Direct generation; Demodulation of FM, Bandpass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM receiver, FM Capture Effect, Illustrative Problems.

UNIT III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, Filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, 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: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.

Radio Receiver measurements: Sensitivity, Selectivity, and fidelity.

UNIT V

Information & Channel Capacity: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Markoff sources, Shannon's encoding algorithm, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memoryless channels, Discrete channels with memory, Shannon – Hartley theorem and its implications, Illustrative problems.

***Text Books**:*

1. *B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.*
2. *Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.*

***Reference Books**:*

1. *A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.*
2. *Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.*
3. *Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.*
4. *R.E. Ziemer & W.H. Tranter, "Principles of Communication-Systems Modulation & Noise", Jaico Publishing House, 2001.*
5. *George Kennedy and Bernard Davis, "Electronics & Communication System", TMH, 2004.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem.	**L**	**C**
	3	**2**

(13A04405) ELECTRONIC CIRCUITS ANALYSIS AND DESIGN LAB

List of Experiments (12 experiments to be done):

Course Objective:

- *Help students make transition from analysis of electronic circuits to design of electronic circuits.*
- *To understand the Analysis of transistor at high frequencies.*
- *To understand the concept of designing of tuned amplifier.*
- *The student will construct and analyze voltage regulator circuits.*
- *To understand the circuit configuration and the principle operation of converters, including diode rectifiers, controlled AC-DC converters and DC choppers*

Learning Outcome:

- *The ability to analyze and design single and multistage amplifiers at low, mid and high frequencies.*
- *Designing and analyzing the transistor at high frequencies.*
- *Determine the efficiencies of power amplifiers.*
- *Determine Frequency response and design of tuned amplifiers.*
- *Able to Analyze all the circuits using simulation software and Hardware.*

I) Design and Simulation in Simulation Laboratory using Any Simulation Software. (Minimum of 6 Experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. A Two Stage RC Coupled Amplifier.
4. Current shunt and Voltage Series Feedback Amplifier
5. Cascade Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

II) Testing in the Hardware Laboratory (6 Experiments)

Any Three circuits simulated in Simulation laboratory

Any Three of the following

Class A Power Amplifier (with transformer load)
Class C Power Amplifier
Single Tuned Voltage Amplifier
Hartley & Colpitt's Oscillators.
Darlington Pair.
MOSFET Amplifier

III) Equipments required for Laboratories:

For software simulation of Electronic circuits

- Computer Systems with latest specifications.
- Connected in LAN (Optional).
- Operating system (Windows XP).
- Suitable Simulations software.

For Hardware simulations of Electronic Circuits

- Regulated Power Supply (0-30V)
- CRO's
- Functions Generators.
- Multimeters.
- Components.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - II Sem. **L** **C**
3 **2**

(13A04406) PULSE & DIGITAL CIRCUITS LAB

Course Objective:

- *To generate Different types of non-sinusoidal signals.*
- *To generate and processing of non-sinusoidal signals.*
- *To learn about Limiting and storage circuits and their applications.*
- *To learn about Different synchronization techniques, basics of different sampling gates and their uses.*
- *To obtain Basics of digital logic families.*

Learning Outcome:

- *Student understands the various design and analysis to generate various types of signals.*
- *Student can design various digital circuits based on the application and specifications.*

Minimum Twelve experiments to be conducted:

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clamper's.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.
14. Constant Current Sweep Generator using BJT.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multi Meters

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III- I Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A02402) CONTROL SYSTEMS ENGINEERING

Course Objective:

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT I CONTROL SYSTEMS CONCEPTS

Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback Characteristics, Effects of positive and negative feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram reduction methods – Signal flow graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver

UNIT II TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional, integral, derivative Controllers, Design of P, PD, PI, PID Controllers.

UNIT III STABILITY ANALYSIS IN FREQUENCY DOMAIN

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis.

Compensation techniques – Lag, Lead, Lead-Lag Compensators design in frequency Domain.

UNIT V STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from Schematic models, differential equations, Transfer function, block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models.

Text Books:

1. *Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.*
2. *Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.*

Reference Books:

1. *Control Systems Engineering - by NISE 5th Edition – John wiley & sons, 2010.*
2. *Control Systems – by – A. Nagoor Kani- First Edition RBA Publications, 2006.*
3. *Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John wiley and sons, 8th edition, 2003.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - I Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A05401) COMPUTER ORGANIZATION AND ARCHITECTURE

Course Objective:

- *To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design*
- *To make the students understand the structure and behavior of various functional modules of a computer.*
- *To understand the techniques that computers use to communicate with I/O devices*
- *To study the concepts of pipelining and the way it can speed up processing.*
- *To understand the basic characteristics of multiprocessors*

Learning Outcome:

- *Ability to use memory and I/O devices effectively*
- *Able to explore the hardware requirements for cache memory and virtual memory*
- *Ability to design algorithms to exploit pipelining and multiprocessors*

UNIT I

Introduction to Computer Organization and Architecture

Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture

UNIT II

CPU Design and Computer Arithmetic

CPU Design: Instruction Cycle – Memory – Reference Instructions – Input/output and Interrupt – Addressing Modes – Data Transfer and Manipulation – Program Control.

Computer Arithmetic: Addition and Subtraction – Multiplication Algorithms – Division Algorithms – Floating-Point Arithmetic Operations – Decimal Arithmetic unit.

UNIT III

Register Transfer Language and Design of Control Unit

Register Transfer: Register Transfer Language – Register Transfer – Bus and Memory Transfers – Arithmetic Micro operations – Logic Micro operations – Shift Micro operations.

Control Unit: Control Memory – Address Sequencing – Micro program Example – Design of Control Unit.

UNIT IV

Memory and Input/output Organization

Memory Organization: Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

Input/output Organization: Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory Access (DMA).

UNIT V

Pipeline and Multiprocessors

Pipeline: Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline.

Multiprocessors: Characteristics of Multiprocessors – Interconnection Structures – Inter Processor Arbitration – Inter Processor Communication and Synchronization.

Text Books:

1. *"Computer Systems Organization and Architecture", John D. Carpinelli, PEA, 2009.*
2. *"Computer Systems Architecture", 3/e, M. Moris Mano, PEA, 2007.*

Reference Books:

1. *"Computer Organization", Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5/e, MCG, 2002.*
2. *"Computer Organization and Architecture", 8/e, William Stallings, PEA, 2010.*
3. *"Computer Systems Architecture a Networking Approach", 2/e, Rob Williams.*
4. *"Computer Organization and Architecture" Ghoshal, Pearson Education, 2011.*
5. *"Computer Organization and Architecture", V. Rajaraman, T. Radakrishnan.*
6. *"Computer Organization and Design", P. Pal Chaudhuri, PHI*
7. *"Structured Computer Organization", Andrew S. Janenbaum, Todd Austin*
8. *"Computer Architecture" Parahmi, Oxford University Press*

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B.Tech. III - I Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04501) ANTENNAS & WAVE PROPAGATION

***Course Objective**:*

1. *To introduce the fundamental principles of antenna theory and various types of antennas.*
2. *Applying the principles of antennas to the analysis, design, and measurements of antennas.*
3. *To know the applications of some basic and practical configurations such as dipoles, loops, and broadband, aperture type and horn antennas.*

***Learning Outcome**:*

Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:

a. *Understand the basic principles of all types of antennas and*
b. *Analyze different types of antennas designed for various frequency ranges.*
c. *Become proficient with analytical skills for understanding practical antennas.*
d. *Design some practical antennas such as dipole, Yagi - uda, and horn antennas.*
e. *Determine the radiation patterns (in principal planes) of antennas through measurement setups.*
f. *Develop technical & writing skills important for effective communication.*
g. *Acquire team-work skills for working effectively in groups.*

UNIT I

Antenna Basics & Dipole antennas: Introduction, Basic antenna parameters- patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height, Fields from oscillating dipole, Field Zones, Shape-Impedance considerations, Polarization – Linear, Elliptical, & Circular polarizations, Antenna temperature, Antenna impedance, Front–to-back ratio, Antenna theorems, Radiation – Basic Maxwell's equations, Retarded potential-Helmholtz Theorem, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Natural current distributions, far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Illustrative problems.

UNIT II

VHF, UHF and Microwave Antennas - I: Loop Antennas - Introduction, Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directives of small and large loops (Qualitative Treatment), Arrays with Parasitic Elements - Yagi - Uda Arrays, Folded Dipoles & their characteristics, Helical Antennas-Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat's Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

UNIT III

VHF, UHF and Microwave Antennas - II: Micro strip Antennas- Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics, reflector antennas - Introduction, Flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas - Geometry of Non-metallic Dielectric Lenses, Zoning , Tolerances, Applications, Illustrative Problems.

UNIT IV

Antenna Arrays & Measurements: Point sources - Definition, Patterns, arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison, BSAa with Non-uniform Amplitude Distributions - General considerations and Bionomial Arrays, Illustrative problems.

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 and 3-Antenna Methods).

UNIT V

Wave Propagation: Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/Mode concepts, Ground wave propagation (Qualitative treatment) - Introduction, Plane earth reflections, Space and surface waves, wave tilt, curved earth reflections, Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption, Super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation, fading and path loss calculations, Sky wave propagation - Introduction, 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, Summary of Wave Characteristics in different frequency ranges, Illustrative problems.

Text Books:

1. *John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, "Antennas and wave propagation," TMH, New Delhi, 4th Ed., (special Indian Edition), 2010.*
2. *E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems," PHI, 2nd Edn, 2000.*

Reference Books:

1. *C.A. Balanis, "Antenna Theory- Analysis and Design," John Wiley & Sons, 2nd Edn., 2001.*
2. *K.D. Prasad, Satya Prakashan, "Antennas and Wave Propagation," Tech. India Publications, New Delhi, 2001.*
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.*
5. *John D. Kraus, "Antennas," McGraw-Hill (International Edition), 2nd Edn., 1988.*

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B.Tech. III - I Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04502) DIGITAL COMMUNICATION SYSTEMS

Course Objective*:*

- *The students to be able to understand, analyze, and design fundamental digital communication systems.*
- *To know various coding techniques such as source coding, line coding, and channel coding.*
- *To understand various digital modulation techniques and their applications.*
- *The course focuses on developing a thorough understanding of digital communication systems by using a series of specific examples and problems.*

Learning Outcome*:*

At the end of the course, the students should be able to:

- *Know the difference between source coding, channel coding, and line coding techniques and apply their concepts in the analysis and design of digital communication systems.*
- *Understand the basic principles of baseband and passband digital modulation schemes.*
- *Analyze probability of error performance of digital systems and are able to design digital communication systems.*
- *Understand the basics of information theory and error correcting codes.*

UNIT I

Source Coding Systems: Introduction, sampling process, quantization, quantization noise, conditions for optimality of quantizers, encoding, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM), Differential PCM (DPCM), Processing gain, Adaptive DPCM (ADPCM), Comparison of the above systems.

UNIT II

Baseband Pulse Transmission: Introduction, Matched filter, Properties of Matched filter, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Partial response signaling, Baseband M-array PAM transmission, Eye diagrams.

UNIT III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt orthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signal constellation diagram.

UNIT IV

Passband Data Transmission: Introduction, Passband transmission model, Coherent phase-shift keying – binary phase shift keying (BPSK), Quadrature shift keying (QPSK), Binary Frequency shift keying (BFSK), Error probabilities of BPSK, QPSK, BFSK, Generation and detection of Coherent BPSK, QPSK, & BFSK, Power spectra of above mentioned modulated signals,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, Comparison of power bandwidth requirements for all the above schemes.

UNIT V

Channel Coding: Error Detection & Correction - Repetition & Parity Check Codes, Interleaving, Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Convolutional Codes – Convolutional Encoding, Decoding Methods.

Text Books:

1. *Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.*
2. *A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.*

Reference Books:

1. *Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley, 2005.*
2. *B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.*
3. *Bernard Sklar, "Digital Communications", Prentice-Hall PTR, 2nd edition, 2001.*
4. *Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.*
5. *J. G. Proakis, M Salehi, Gerhard Bauch, "Modern Communication Systems Using MATLAB," CENGAGE, 3rd Edition, 2013.*

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B.Tech. III - I Sem.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04504) DIGITAL IC APPLICATIONS

Course Objective:

- *To be able to use computer-aided design tools for development of complex digital logic circuits*
- *To be able to model, simulate, verify, analyze, and synthesize with hardware description languages*
- *To be able to design and prototype with standard cell technology and programmable logic*
- *To be able to design tests for digital logic circuits, and design for testability*

Learning Outcome:

- *Able to use computer-aided design tools for development of complex digital logic circuits.*
- *Able to model, simulate, verify, analyze, and synthesize with hardware description languages.*
- *Able to design and prototype with standard cell technology and programmable logic.*
- *Able to design tests for digital logic circuits, and design for testability.*

UNIT I

CMOS LOGIC: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

BIPOLAR LOGIC AND INTERFACING: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT II

The VHDL Hardware Description Language: Design flow, program structure, types and constants, functions and procedures, libraries and packages.

The VHDL design elements: Structural design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT III

Combinational Logic Design: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers, VHDL models for the above ICs.

UNIT IV

Design Examples (using VHDL): Barrel shifter, comparators, floating-point encoder, and dual parity encoder.

Sequential logic Design: Latches & flip flops, PLDs, counters, shift register and their VHDL models, Synchronous design methodology.

UNIT V

ROMs: Internal Structure, 2D – decoding commercial types, timing and applications.

Static RAMs: Internal Structure, timing and standard SRAMs, Synchronous SRAMs.

Dynamic RAMs: Internal Structure, timing and standard DRAMs, Synchronous DRAMs.

Text Books:

1. *Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.*
2. *A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.*

Reference Books:

1. *Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 2nd edition, 2008.*
2. *Fundamentals of Digital Logic with VHDL Design – Stephen Borwn and Zvonko Vramesic, McGraw Hill, 2nd Edition., 2005.*

LINEAR IC APPLICATIONS

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

Course Objectives:
To make the student understand the basic concepts in the design of electronic circuits using linear integrated circuits and their applications. To introduce some special function ICs.

Learning Outcomes:

Upon completion of the course, students will be able to:

- Understand the basic building blocks of linear integrated circuits and its characteristics.
- Analyze the linear, non-linear and specialized applications of operational amplifiers.
- Understand the theory of ADC and DAC.

UNIT – I DIFFERENTIAL AMPLIFIERS AND OPAMPS

Differential Amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator.
Operational amplifiers: Introduction, Block diagram, Ideal op-amp, Equivalent Circuit, Voltage Transfer curve, open loop op-amp configurations.Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

UNIT-II OP-AMP WITH NEGATIVE FEEDBACK AND FREQUENCY RESPONSE

Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.
Frequency response: Introduction, compensating networks, frequency response of internally compensated op-amps and non compensated op-amps, High frequency op-amp equivalent circuit, open loop gain Vs frequency, closed loop frequency response, circuit stability, slew rate.

UNIT-III OP-AMP APPLICATIONS -1

DC and AC amplifiers, peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas biquad filter.

UNIT-IV OP-AMP APPLICATIONS -2

Oscillators, Phase shift and wein bridge oscillators, Square, triangular and sawtooth wave generators, Comparators, zero crossing detector, Schmitt trigger, characteristics and limitations.

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Specialized applications: 555 timer IC (monostable&astable operation) & its applications, PLL, operating principles, Monolithic PLL, applications, analog multiplier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

UNIT V ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode *R - 2R* Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications – Flash type – Successive Approximation type – Single Slope type – Dual Slope type – A/D Converter using Voltage-to-Time Conversion – Over-sampling A/D Converters,

TEXT BOOKS:

1. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd, 2nd Edition, 2003.
2. K.Lal Kishore, "Operational Amplifiers and Linear Integrated Circuits", Pearson Education,2007.
3. TL082: Data Sheet: http://www.ti.com/lit/ds/symlink/tl082.pdf
   Application Note: http://www.ti.com/lit/an/sloa020a/sloa020a.pdf
4. MPY634: Data Sheet: http://www.ti.com/lit/ds/symlink/mpy634.pdf
   Application Note: http://www.ti.com/lit/an/sbfa006/sbfa006.pdf

REFERENCES:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI, 4th edition,1987.
2. R.F.Coughlin& Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits", 6th Edition, PHI.
3. David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd edition, 2010.
4. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits" McGraw Hill, 1988.
5. C.G. Clayton, "Operational Amplifiers", Butterworth & Company Publ. Ltd./ Elsevier, 1971.

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IC APPLICATIONS LAB

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

All experiments are based upon 741 / TL 082/ASLK Kits.

1. Study the characteristics of negative feedback amplifier

Aim:

Design the following amplifiers:

a) A unity gain amplifier
b) A non-inverting amplifier with a gain of 'A'
c) An inverting amplifier with a gain of 'A'

Apply a square wave of fixed amplitude and study the effect of slew rate on the three type of amplifiers.

Applications:

- Amplifying bioelectric potentials (ECG, EEG, EMG, EOG) and piezoelectric with high output impedance.
- Amplifying sensor output signals (temperature sensors, humidity sensors, pressure sensors etc.)

Sample questions

Explain the need for unity gain amplifier.
Advantages of op-amp based amplifiers as compare to BJT amplifiers.
Mention the applications for inverting and non-inverting amplifiers.
Give your inference on the frequency response of the amplifier.
Give the significance of gain-bandwidth product.

****

2. Design of an instrumentation amplifier

Aim:

Design an instrumentation amplifier of a differential mode gain of 'A' using three amplifiers.

Applications:

- Used in measuring instruments designed for achieving high accuracy and high stability.
- Used for amplifying low voltage, low frequency and higher output impedance signals.

Sample questions

Explain the need for two stages in any instrumentation amplifier.
Why CMRR is high for instrumentation amplifiers?
Give some examples for low voltage, low frequency and higher output impedance signals.
How does the tolerances of resistors affect the gain of the instrumentation amplifier?

****

3. Study the characteristics of regenerative feedback system with extension to design an astablemultivibrator

Aim:

Design and test an astablemultivibrator for a given frequency.

Applications

- It can be used in signal generators and generation of timing signals.
- It can be used in code generators and trigger circuits.

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Sample question

Discuss the difference between astable and bi-stable multivibrator.
Discuss the frequency limitation of astablemultivibrator.
Discuss the various applications of bi-stable multivibrator.

****

4. Study the characteristics of integrator circuit

Aim:

Design and test the integrator for a given time constant.

Applications

- Used in function generators, PI/PID controllers.
- Used in analog computers, analog-to-digital converters and wave-shaping circuits.
- Used as a charge amplifier.

Sample questions

Compare the output with that of ideal integrator.
How will you design a differentiator and mention its drawback.
Discuss the limitation of the output voltage of the integrator.
How will you obtain drift compensation in an inverting integrator?

****

5. Design of Analog filters – I

Aim:

Design a second order butterworth band-pass filter for the given higher and lower cut-off frequencies.

Applications:

- Used in signal conditioning circuits for processing audio signals.
- Used in measuring instruments.
- Used in radio receivers.

Sample questions

Discuss the effect of order of the filter on frequency response.
How will you vary Q factor of the frequency response.
Discuss the need for going to Sallen Key circuit.
Compare the performance of Butterworth filter with that of Chebyshev filter.

****

6. Design of Analog filters – II

Aim:

Design and test a notch filter to eliminate the 50Hz power line frequency.

Applications

- Used for removing power supply interference.
- Used for removing spur in RF signals.

Sample questions

Explain the effect of supply frequency interference while amplifying sensor signals.
Suggest a method for adjusting the Q factor of the frequency response of notch filter.
What is the purpose of going for Twin T notch filter circuit?

****

7. Design of a self-tuned Filter

Aim: Design and test a high-Q Band pass self-tuned filter for a given center frequency.

Applications:

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- Used in spectrum analyzers

Sample Question:

Discuss the effect of the harmonics when a square wave is applied to the filter

Determine the lock range of the self-tuned filter

****

8. Design of a function generator

Aim:

Design and test a function generator that can generate square wave and triangular wave output for a given frequency.

Applications:

- Used in testing, measuring instruments and radio receivers.
- Used for obtaining frequency response of devices and circuits.
- Used for testing and servicing of Electronic equipments.
- Used in Electronic musical instruments.
- Used for obtaining audiograms (Threshold of audibility Vs frequency)

Sample questions

Discuss typical specifications of a general purpose function generator.

How can you obtain reasonably accurate sine wave from triangular wave.

Discuss the reason for higher distortion in sine wave produced by function generators.

What do you mean by Duty cycle and how can you vary the same in a function generator?

****

9. Design of a Voltage Controlled Oscillator

Aim:

Design and test voltage controlled oscillator for a given specification (voltage range and frequency range).

Applications:

- Used in Phase Lock Loop (PLL) circuits.
- Used in frequency modulation circuits.
- Used in Function generators
- Used in frequency Synthesizers of Communication equipments.

Sample Questions

Discuss the following characteristics of a voltage controlled Oscillator.

i) Tuning range
ii) Tuning gain and
iii) Phase noise

Compare the performances VCO based Harmonic Oscillators and Relaxation Oscillators

What are the various methods adopted in controlling the frequency of oscillation in VCOs

Discuss any one method of obtaining FM demodulation using a VCO.

****

10. Design of a Phase Locked Loop(PLL)

Aim:

Design and test a PLL to get locked to a given frequency 'f'. Measure the locking range of the system and also measure the change in phase of the output signal as input frequency is varied with in the lock range.

Applications:

- Used in tracking Band pass filter for Angle Modulated signals.

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- Used in frequency divider and frequency multiplier circuits.
- Used as Amplifiers for Angle Modulated signals.
- Used in AM and FM Demodulators
- Used in Suppressed Carrier Recovery Circuits

Sample Questions:

Draw the block diagram of a PLL based divider and multiplier and explain the functions performed by each block.

Distinguish between Lock range and Capture Range, Explain the method of estimating the same for a given PLL circuit.

Discuss the differences between Analog Phase Lock Loop and Digital Phase Lock Loop.

****

11. Automatic Gain Control (AGC) Automatic Volume Control (AVC)

Aim:

Design and test an AGC system for a given peak amplitude of sine-wave output.

Applications

- Used in AM Receivers
- Used as Voice Operated Gain Adjusting Device (VOGAD) in Radio Transmitters
- Used in Telephone speech Recorders
- Used in Radar Systems

Sample Questions

Explain clearly the need for AGC in AM Receivers.

Draw the block diagram of feedback and feed forward AGC systems and explain the functions of each block.

Discuss any one gain control mechanism present in biological systems.

How can you use AGC in a Received Signal Strength Indicator (RSSI)

****

12. Design of a low drop out regulator

Aim:

Design and test a Low Dropout regulator using op-amps for a given voltage regulation characteristic and compare the characteristics with TPS7250 IC

Applications:

- Used in Power Supply of all Electronic Instruments and Equipment's
- Used as Reference Power Supply in Comparators
- Used in Emergency Power Supplies
- Used in Current Sources

Sample Questions

Distinguish between Load Regulation and Line Regulation.

Mention some of the other important parameters in selecting a LDO.

What is power supply rejection ratio (PSRR)?

****

13. DC-DC Converter

Aim:

Design of a switched mode power supply that can provide a regulated output voltage for a given input range using the TPS40200 IC

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Applications:

- Used is DSL/Cable Modems
- Used in Distributed Power Systems

Sample Questions

Discuss the effect of varying the input voltage for a fixed regulated output voltage over the duty cycle of PWM.

References:

1. TL082: Data Sheet: http://www.ti.com/lit/ds/symlink/tl082.pdf
   Application Note: http://www.ti.com/lit/an/sloa020a/sloa020a.pdf
2. MPY634: Data Sheet: http://www.ti.com/lit/ds/symlink/mpy634.pdf
   Application Note: http://www.ti.com/lit/an/sbfa006/sbfa006.pdf
3. ASLK Pro Manual: ASLK Manual

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ANNEXURE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

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(13A04506) ANALOG & DIGITAL COMMUNICATION SYSTEMS LAB

ANALOG COMMUNICATION SYSTEMS

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

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Pulse amplitude modulation & demodulation.
4. Radio receiver measurements – sensitivity selectivity and fidelity.
5. Measurement of half power beam width (HPBW) and gain of a half wave dipole antenna.
6. Measurement of radiation pattern of a loop antenna in principal planes.

DIGITAL COMMUNICATION SYSTEMS

Hardware Experiments: (All Experiments are to be conducted)

1. Time division multiplexing.
2. Pulse code modulation.
3. Delta modulation.
4. Frequency shift keying.
5. QPSK modulation and demodulation.
6. Differential phase shift keying

Software Experiments: (All Experiments are to be conducted)

Modeling of Digital Communications using MATLAB

1. Time division multiplexing.
2. Pulse code modulation.
3. Delta modulation.
4. Frequency shift keying.
5. QPSK modulation and demodulation.
6. Differential phase shift keying

NOTE:- Experiments from Digital communication Systems part should be done in both hardware & software.

EQUIPMENT REQUIRED FOR LABORATORIES:

1. Radio Receiver Demo kits or Trainers.
2. RF power meter — frequency range 0 – 1000 MHz
3. Spectrum Analyzer
4. Dipole antennas (2 Nos.) — 850 MHz – 1GHz
5. Loop antenna (1 no.) — 850 MHz – 1GHz
6. Bread Boards
   1. RPS - 0 – 30 V
   2. CROs - 0 – 20 M Hz.
   3. Function Generators - 0 – 1 M Hz
   4. RF Generators (3 Nos.) - 0 – 1000 M Hz.
   5. Multimeters
   6. Lab Experimental kit for Pulse Code Modulation (Experiment No.2 of Digital Communication Systems part)
   7. Required Electronic Components (Active and Passive) which include required ICs

8. Arbitrary Wave form generators/ PNS generators – 2 Nos. (to generate digital data at required data rates)
9. Licensed MATLAB software for 30 users with required tool.

Outcomes:

After completion of the course the students will be able

- To experience real time behavior of different analog modulation schemes
- Technically visualize spectra of different analog modulation schemes
- Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.
- Measure characteristics of radio receiver and antenna measurements.
- After completion of the course the students will be able to experience real time behavior of different digital modulation schemes and technically visualize spectra of different digital modulation schemes

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B.Tech-III-II sem (E.C.E)	T	Tu	C
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(13A52501) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Course Objective:

The objectives of this course are to 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.

Learning Outcome:

The 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 Isocosts, 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. Forms of Business Organization – Sole Proprietorship- Partnership – Joint Stock Companies – Public Sector Enterprises – 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. *Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.*
2. *Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.*

Reference Books:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E)	T	Tu	C
	3	1	3

(13A04601) MICROPROCESSORS AND MICROCONTROLLERS

***Course Objectives*:**

- To understand the architecture of8086 MICROPROCESSOR.
- To learn various 8086 Instruction set and Assembler Directives.
- To become skilled in 8086 Assembly Language programming.
- To understand programmable peripheral devices and their Interfacing.
- To understand and learn 8051 microcontroller.
- To learn 8051 assembly Language programming

***Learning Outcomes*:**

- Becomes skilled in various 8086 Instruction set and Assembler Directives
- Able to write8086 Assembly Language programs.
- Able to understand programmable peripheral devices and their Interfacing.
- Able to write 8051 assembly Language programs.

UNIT-I 8085 ARCHITECTURE

Introduction-8085 Architecture-Block Diagram, Flag Register, Pin Diagram, Timing and Control Signals, System Timing Diagram, Instruction Set of 8085- Instruction & Data Formats-Addressing Modes- Instructions.

UNIT-II 8086 ARCHITECTURE

8086 Over View-Internal Architecture- Register Organization, Memory Segmentation, Flag Register, Pin Configuration, Physical Memory Organization, General Bus Operation- Minimum and Maximum Mode Signals, Timing Diagrams - Interrupts Of 8086.

UNIT-III INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMMING OF 8086

Instruction Formats -Addressing Modes-Instruction Set, Assembler Directives-Macros, Programs Involving Logical, Branch Instructions – Sorting and Evaluating Arithmetic Expressions - String Manipulations-Simple ALPs.

UNIT-IV INTERFACING DEVICES

8255 PPI- Block Diagram, Various Modes of Operation-Programmable Interval Timer 8254-Architecture,Operating Modes – Key Board/Display Controller 8279- Architecture, Modes of Operation, Command Words and Key Code and Status Data Formats-Programmable Communication Interface8251 USART-Architecture, Description Of Operating Modes-DMA Controller 8257- Internal Architecture and Signal Description .

UNIT-V INTRODUCTION TO MICRO CONTROLLERS 8051

Introduction, Architecture, Registers, Pin Description, Connections, I/O Ports, Memory Organization, Addressing Modes, Instruction Set, Architectural features of Intels 16 bit Micro Controller.

TEXT BOOKS:

1. A.K.Ray and Bhurchandi, "Advanced Microprocessors and Peripherals", 2nd Edition, TMH Publications.
2. Ajay V. Deshmukh, "Microcontrollers, Theory and applications", Tata McGraw-Hill Companies – 2005

REFERENCE BOOKS:

1. Douglas V.Hall, "Microprocessors and Interfacing", 2nd Revised Edition, TMH Publications.
2. Liu & Gibson, "Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design", 2nd ed., PHI
3. Kenneth j.Ayala, Thomson, "The 8051 Microcontrollers", Asia Pte.Ltd
4. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publishers

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E)	T	Tu	C
	3	1	3

(13A04602) DIGITAL SIGNAL PROCESSING

Course Objectives:

- To use Z transforms and discrete time Fourier transforms to analyze a digital system.
- To design and understand simple finite impulse response filters
- To understand stability of FIR filters
- To know various structures used in the implementation of FIR and IIR filters
- Window method design structure for implementation.

Learning Outcomes:

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

- Describe the Sampling Theorem and how this relates to Aliasing and Folding.
- Determine if a system is a Linear Time-Invariant (LTI) System and Take the Z-transform of a LTI system.
- Find the frequency response of FIR and IIR filters through analysis.
- Understand the relationship between poles, zeros, and stability and determine the spectrum of a signal using the DFT, FFT, and spectrogram.
- Design, analyze, and implement various digital filters.

UNIT-I

Introduction: Review of discrete-time signals and systems – Time domain analysis of discrete-time signals & systems, Frequency domain analysis of discrete-time signals and systems. Discrete Fourier Transform: Frequency-domain sampling and reconstruction of discrete-time signals, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering methods based on DFT, Frequency analysis of signals using the DFT.

UNIT-II

Fast Fourier Transform Algorithms (FFTA): Efficient computation of the DFT – Direct computation of DFT, Divide and conquer approach to computation of DFT, Radix-2, Radix-4, and Split radix FFT algorithms, Implementation of FFT algorithms, Applications of FFT algorithms – Efficient computation of the DFT of two real sequences, 2N point real sequences, Use of the FFT algorithm in linear filtering and correlation, A linear filtering approach to computation of the DFT- the Goertzel, and the Chirp-z transform algorithms, Quantization errors in the computation of DFT.

UNIT-III

Implementation of Discrete-Time Systems: Structures for the realization of discrete-time systems, Structures for FIR systems - Direct form, Cascade form, Frequency sampling, and Lattice structures, Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel form and Lattice structures, Conversion from Lattice structure to direct form, lattice –Ladder structure.

UNIT-IV

Design of Digital Filters: General considerations – Causality and its implications, Characteristics of practical Frequency Selective Filters, Design of Finite Impulse Response (FIR) filters – Symmetric and asymmetric FIR filters, Design of linear phase FIR filters using windows, Design of linear phase FIR filters by the frequency sampling method, Design of optimum equi-ripple linear phase FIR filters, Comparison of design methods for linear phase FIR filters, Design of Impulse Invariance Response (IIR) filters from analog filters – IIR filter design by approximation of derivatives, by Impulse invariance, and by bilinear transformation methods, Characteristics of commonly used analog filters, Design examples of both FIR and IIR filters, Frequency transformation in the analog and digital domains, Illustrative problems.

UNIT-V

Multirate Digital Signal Processing: Introduction, Decimation, and interpolation, Sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multistage implementation of sampling rate conversion, Sampling rate conversion of bandpass signals, Sampling rate conversion by arbitrary factor, Applications of multirate signal processing.

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications," Pearson Education/PHI, 4th ed., 2007.
2. Sanjit K Mitra, "Digital signal processing, A computer base approach," Tata McGraw Hill, 3rd edition, 2009.

REFERENCES:

1. A.V.Oppenheim and R.W. Schaffer, & J R Buck, "Discrete Time Signal Processing," 2nd ed., Pearson Education, 2012.
2. B. P. Lathi, "Principles of Signal Processing and Linear Systems," Oxford Univ. Press, 2011.
3. Li Tan, Jean Jiang, "Digital Signal Processing, Fundamentals and Applications," Academic Press, Second Edition, 2013.
4. Andreas Antoniou, "Digital Signal Processing," TATA McGraw Hill, 2006.
5. Schaum's outlines M H Hayes, "Digital Signal Processing," TATA Mc-Graw Hill, 2007.
6. A. Anand Kumar, "Digital Signal Processing," PHI Learning, 2011.

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B.Tech-III-II sem (E.C.E)	T	Tu	C
	3	1	3

(13A04603) MICROWAVE ENGINEERING

Course Objectives:

- To analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
- To Use S-parameter terminology to describe circuits.
- To explain how microwave devices and circuits are characterized in terms of their "S" Parameters.
- To give students an understanding of microwave transmission lines.
- To Use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc..
- To give students an understanding of basic microwave devices (both amplifiers and oscillators).
- To expose the students to the basic methods of microwave measurements.

Learning Outcomes:

At the end of the semester, students are provided learning experiences that enable them to:

- Analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
- Understand the various principles involved in various Microwave oscillators and amplifiers such as Klystron tubes, TWTs, Magnetrons, Gunn diode etc.
- Use S-parameter terminology & to describe the characteristics of microwave circuits through scattering parameters.
- Ability to understanding of microwave transmission lines and how to use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc.
- Set up the microwave benches for measurement of various parameters such as microwave frequency, VSWR, Impedance of unknown load etc.
- Verify the characteristics of Microwave devices through measurements.

UNIT-I

Waveguides & Resonators: Introduction, Microwave spectrum and bands, applications of Microwaves, Rectangular Waveguides-Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Cutoff frequencies, filter characteristics, dominant and degenerate modes, sketches of TE and TM mode fields in the cross-section, Mode characteristics - Phase and Group velocities, wavelengths and impedance relations, Circular Waveguides - Dominant mode (qualitative treatment only), Rectangular Waveguides – Power Transmission and Power Losses, Impossibility of TEM Modes, losses, Q-factor, Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies, Q-factor and coupling coefficients, Illustrative Problems.

UNIT-II

Waveguide Components: Scattering Matrix - Significance, Formulation and properties, Coupling mechanisms - Probe, Loop, Aperture types, Wave guide discontinuities - waveguide Windows, tuning screws and posts, matched loads, Waveguide attenuators - Resistive card, rotary vane Attenuators, waveguide phase shifters-dielectric, rotary vane phase shifters, Wave guide multiport junctions - E plane and H plane Tees, Magic Tee, Directional couplers-2 hole, Bothe hole types, Ferrites-composition and characteristics, Faraday rotation, Ferrite components - Gyrator, Isolator, Circulator, S Matrix calculations for 2-port junction, E plane and H plane Tees, Magic Tee, Directional coupler, circulator and Isolator, Illustrative Problems.

UNIT-III

Linear beam Tubes: Limitations and losses of conventional tubes at microwave frequencies, Classification of Microwave tubes, 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, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and o/p characteristics, Effect of Repeller Voltage on Power o/p, Significance, types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Suppression of oscillations, Gain considerations.

UNIT - IV

Cross-field Tubes & Microwave Semiconductor Devices: Introduction, Cross field effects, Magnetrons-different types, cylindrical travelling wave magnetron-Hull cutoff and Hartree conditions, modes of resonance and PI-mode operation, separation of PI-mode, O/P characteristics, Introduction to Microwave semiconductor devices, classification, applications, Transfer Electronic Devices, Gunn diode - principles, RWH theory, Characteristics, Basic modes of operation - Gunn oscillation modes, LSA Mode, Varactor diode, Parametric amplifier, Introduction to Avalanche Transit time devices (brief treatment only), Illustrative Problems.

UNIT-V

Microwave Measurements: Description of Microwave bench-different blocks and their features, errors and precautions, Microwave power measurements, Measurement of attenuation, frequency, VSWR (low, medium, high), Measurement of 'Q' of a cavity, Impedance measurements.

TEXT BOOKS:

1. Samuel Y. Liao, "Microwave devices and circuits," Pearson, 3rd Edition, 2003.
2. Herbert J. Reich, J. G. Skalnik, P. F. Ordung and 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. Om. P. Gandhi, "Microwave Engineering and Applications," Pergamon, 1981.
3. David M. Pozer, "Microwave Engineering," Wiley India Pvt. Ltd., 3rd Edition, 2010.
4. Rajeswari Chatterjee, "Elements of Microwave Engineering," Ellis Horwood Ltd., Publisher, 1986.
5. Peter A.Rizzi, "Microwave Engineering Passive Circuits," PHI, 1999.
6. F. E. Terman, "Electronic and Radio Engineering," McGraw-Hill, 4th Edition, 1995.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E)	T	Tu	C
	3	1	3

(13A04604) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Outcomes:

After the completion of the course the students will be able to

- Understand basic principles involved in the meters for measuring voltage, current, resistance, frequency and so on.
- Employ CRO for measuring voltage, current, resistance, frequency and so on.
- Understand principles of measurements associated with different bridges.
- Get complete knowledge regarding working of advanced instruments such as logic analyzers and spectrum analyzers.

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).Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

UNIT-III

Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, 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, Interference and noise reduction techniques.

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, pH measurement Signal Conditioning Circuits.

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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B.Tech-III-II sem (E.C.E)	T	Tu	C
	3	1	3

(13A04605) TELECOMMUNICATION SWITCHING NETWORKS

Course Outcomes:

- Able to understand the concepts of Frequency and Time division multiplexing.
- Able to analyze the concepts of space switching, time switching and combination switching.
- Able to acquire knowledge needed for network synchronization, network control and management issues.
- Able to apply concepts of statistical modeling for telephone traffic and to characterize blocking probability holding service time distributions for in speech and data networks.

UNIT I MULTIPLEXING: Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings, SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

UNIT II DIGITAL SWITCHING: Switching Functions, Space Division Switching, Time Division Switching, twodimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SS7 signaling.

UNIT III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT: Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT IV DIGITAL SUBSCRIBER ACCESS: ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital

Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

UNIT V TRAFFIC ANALYSIS: Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

TEXTBOOK:

1. J. Bellamy, "Digital Telephony", John Wiley, 2003, 3rd Edition.
2. 2. JE Flood, "Telecommunications Switching, Traffic and Networks", Pearson.
3. Viswanathan. T., "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.

REFERENCES:

1. R.A.Thomson, "Telephone switching Systems", Artech House Publishers, 2000.
2. W. Stalling, " Data and Computer Communications", Prentice Hall, 1993.
3. T.N.Saadawi, M.H.Ammar, A.E.Hakeem, "Fundamentals of Telecommunication Networks", Wiley Interscience, 1994.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E)	T	Tu	C
	3	1	3

(13A04606) TELEVISION AND VIDEO ENGINEERING

Course Objectives:

- To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture tubes and Television Camera Tubes.
- To study the various Color Television systems with a greater emphasis on television standards.
- To study the advanced topics in digital television and High definition television.

Course Outcome:

- Able to understand the transmission of video signals and importance of television standards to effectively work with broadcasting applications.
- Able to acquire sound knowledge of latest topics in digital video transmission.
- Able to analyze various Color Television systems with a greater emphasis on television standards.
- Able to understand advanced topics in digital television and High definition television.

UNIT I: Television Fundamentals Scanning-Interlaced-Progressive-Synchronizing Pulses-Composite video waveform-Common image format-Active line-Aspect ratio-Pixels & Bandwidth-Video Bandwidth-Television Broadcasting-Modulation-Frequency Spectrum-Channel allocation- Light and colour-The sensation of colour-Primary colours-The colour triangle-Saturation and hue-Colour temperature.

UNIT II: Color Television Signal and Systems Color Characteristics-Chromaticity diagram-Color Cameras- Color Signal Generation and Encoding; Color Television Standards-NTSC-Encoder-Decoder-SECAM-Encoder-Decoder-PAL Systems-Encoder-Decoder;

UNIT III: Display Device Technologies. Color picture display devices-Trinitron- -Plasma displays- Introduction to Flat panel displayResolution: flat panel versus CRT-Plasma operation-Scanning: Sequential and Interlaced LCD displays- Polarization-Principles of operation of LC cell-Reflective and Transmissive-The TN Transmissive LCD- -TFT cell drive-Response time-Polarity inversion-Grayscale and colour generation

UNIT IV: Television Receivers The analogue TV receiver-The front end-RF oscillator-Mixer-oscillator-Complete tuner-The phase-locked loop-Synthesized tuning-The IF stage-The IF response curve-The vision detectorSynchronous demodulator- Flat panel television receivers-Video formatting-Scan-rate conversion-Image scaling-De-gamma correction and error and diffusion -Digital video interfaceHigh definition multimedia interface

UNIT V: Digital and High Definition Television Principles of digital video broadcasting-Digitizing the TV picture-SDTV sampling rate-Video sampling-Sampling structure-The bit rate-HDTV common interface format-Intra-frame (spatial) prediction-Intra-blocks and modes-Size and mode selection-Intra-prediction operation-AVC motion compensation-Motion compensation block sizes-Motion vector prediction.

Text Books:

1. Gulati.R.R, "Modern Television Practice", New Age International Publishers, 2nd Edition(2006)
2. M. Dhake,"Television and Video Engineering", 2nd Edition, Tata-McGraw Hill publications (2003).

Reference Books:

1. Herve Benoit, "Digital TV for Satellite Broadcasting", Elsevier Publication, 4th Edition (2005).
2. Lars Ingemar Lundstrom, "Understanding Digital Television", Elsevier Publications 1st Edition (2006).
3. K.F Ibrahim, "Television and Video Technology", 4th Edition, Newnes Publications (2007).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E)	T	Tu	C
	3	1	3

(13A04607) ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS

Course Objectives:

- Understand neural networks fundamentals and pattern classification theory.
- Express the functional components of neural network classifiers and
- Develop and implement a basic fuzzy logic theory and classifiers.
- Develop and implement fuzzy logic system.
- Understand the programming concept of Pattern classification using neural network and Apply fuzzy set operations and defuzzification for control system applications.

Course Outcomes:

- Generate logic functions like AND,OR, XOR using learning rules and apply Hebb rule and perception learning rule for pattern classification problem.
- Develop back propagation algorithm and other basic training algorithms for feed forward networks.
- Implemented a basic fuzzy logic theory and classifiers.
- Apply the rules of fuzzy logic for fuzzy controller.
- Apply fuzzy set operations and defuzzification for control system applications and Applications of neural nets in different fields

UNIT I INTRODUCTION: Basic building blocks of ANN, ANN terminologies, comparison between Artificial & Biological neural networks, Learning Rules, Network Architectures, Fundamental Models of ANN, Neural Net for Pattern Classification- Hebb Net, Perceptron , Adaline., examples. Madaline network – Architecture, training algorithm.

UNIT II FEED FORWARD AND FEEDBACK NETWORKS: Back propagation network-Architecture, training algorithm, Discrete Hopfield network –architecture, training algorithm and energy analysis, Radial Basis Function network -Architecture, training algorithm. Associative neural network- Hetero associative neural net architecture and Auto associative net architecture, Examples with missing and mistake data

UNIT III FUZZY SET THEORY: Fuzzy vs crisp sets, crisp sets, Operations on crisp sets, properties of crisp sets, partition and covering. Membership function, Basic fuzzy set operations, properties of Fuzzy sets, Crisp relations and Fuzzy relations.

UNIT IV FUZZY SYSTEMS: Crisp logic: Laws of propositional logic, inference in propositional logic. Predicate logic: Interpretations of predicate logic formula, inference in predicate logic. Fuzzy logic: Fuzzy Quantifiers, Fuzzy inference. Fuzzy rule based system, defuzzification. Applications: Greg Viot's Fuzzy cruise controller, Air conditioner controller.

UNIT V APPLICATIONS: Pattern classification using Hebb net and McCulloch – Pitts net, Pattern recognition using Perceptron Networks, Applications of neural nets in different fields ,Implementation of all fuzzy operations on both discrete and continuous fuzzy sets, Defuzzification, Fuzzy inference system.

TEXT BOOKS:

1. S. Rajasekaran, G.A. VijayalakshmiPai, "Neural Networks, Fuzzy logic and Genetic algorithms", PHI, 2003.
2. Timothy Ross, "Fuzzy Logic with Engineering Applications", John Wiley and Sons,2004.
3. S. N. Sivanandam, S. Sumathi, S N Deepa , "Introduction to Neural Networks using Matlab 6.0", Tata McGraw Hill, 2006.

REFERENCE BOOKS:

1. Jacek M. Zurada , "Introduction to Artificial Neural Systems", Jaico Publishing House.
2. Fundamentals of Neural Networks, Architectures, Algorithms, and Applications, Laurene Fausett, Pearson Educaation,2004
3. B.Kosko, "Neural Networks and Fuzzy systems, Prentice Hall, 1991.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E)

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(13A04608) DIGITAL SIGNAL PROCESSING LAB

Course Objectives:

- To design real time DSP systems and real world applications.
- To implement DSP algorithms using both fixed and floating point processors.
- To generate the basis function of different transforms.

Learning Outcomes:

- Able to design real time DSP systems and real world applications.
- Able to implement DSP algorithms using both fixed and floating point processors.

List of Experiments: (Minimum of 5 experiments are to be conducted from each part)

Software Experiments (PART – A)

1. Generation of random signal and plot the same as a waveform showing all the specifications.
2. Finding Power and (or) Energy of a given signal.
3. Convolution and Correlation (auto and cross correlation) of discrete sequences without using built in functions for convolution and correlation operations.
4. DTFT of a given signal
5. N – point FFT algorithm
6. Design of FIR filter using windowing technique and verify the frequency response of the filter.
7. Design of IIR filter using any of the available methods and verify the frequency response of the filter.
8. Design of analog filters.

Using DSP Processor kits (Floating point) and Code Composure Studio (CCS) (PART – B)

1. Generation of random signal and plot the same as a waveform showing all the specifications.
2. Finding Power and (or) Energy of a given signal.
3. Convolution and Correlation (auto and cross correlation) of discrete sequences without using built in functions for convolution and correlation operations.
4. DTFT of a given signal
5. N – point FFT algorithm
6. Design of FIR filter using windowing technique and verify the frequency response of the filter.

7. Design of IIR filter using any of the available methods and verify the frequency response of the filter.
8. Design of analog filters.

Equipment/Software Required:

1. Licensed MATLAB software with required tool boxes for 30 users.
2. DSP floating Processor Kits with Code Composure Studio (8 nos.)
3. Function generators
4. CROs
5. Regulated Power Supplies.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E)

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(13A04609) MICROPROCESSORS & MICROCONTROLLERS LAB

***Course Objectives*:**

- To become skilled in 8086 Assembly Language programming.
- To understand programmable peripheral devices and their Interfacing.
- To understand and learn 8051 microcontroller.
- To learn 8051 assembly Language programming

***Learning Outcomes*:**

- Able to write8086 Assembly Language programs.
- Able to understand programmable peripheral devices and their Interfacing.
- Able to write 8051 assembly Language programs.

Minimum **Ten** Experiments to be conducted (**Five** from each section)

I) 8086 Microprocessor Programs using MASM/8086 kit.

1. Introduction to MASM Programming.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison.

Interfacing:

1. 8259 – Interrupt Controller and its interfacing programs
2. 8255 – PPI and its interfacing programs (A /D, D/A, stepper motor,)
3. 7-Segment Display.

II) Microcontroller 8051 Trainer kit

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
2. Logic operations – Shift and rotate.
3. Sorting- Ascending and descending order.

Interfacing using 8051 Trainer kit:

1. Key board Interfacing
2. Seven Segment display
3. Switch Interfacing
4. Relay Interfacing
5. UART

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech-III-II sem (E.C.E) L 3

(13A52502) ADVANCED COMM. SKILLS LAB (AUDIT COURSE)

Introduction:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- *Gathering ideas and information to organise ideas relevantly and coherently.*
- *Engaging in debates.*
- *Participating in group discussions.*
- *Facing interviews.*
- *Writing project/research reports/technical reports.*
- *Making oral presentations.*
- *Writing formal letters.*
- *Transferring information from non-verbal to verbal texts and vice-versa.*
- *Taking part in social and professional communication.*

Course Objective:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- *To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.*
- *Further, they would be required to communicate their ideas relevantly and coherently in writing.*
- *To prepare all the students for their placements.*

Learning Outcome:

- *Accomplishment of sound vocabulary and its proper use contextually*
- *Flair in Writing and felicity in written expression.*
- *Enhanced job prospects.*
- *Effective Speaking Abilities*

The following course content to conduct the activities is prescribed for the Advanced English Language Communication Skills (AELCS) Lab:

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. Covering 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 discussions
2. Interview skills
3. Psychometric tests

Minimum Requirement:

The Advanced English Language Communication Skills (AELCS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

- *Spacious room with appropriate acoustics.*
- *Round Tables with movable chairs*
- *Audio-visual aids*
- *LCD Projector*
- *Public Address system*
- *P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ*
- *T. V, a digital stereo & Camcorder*
- *Headphones of High quality*

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

K-VAN SOLUTIONS-Advanced communication lab

1. *DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.*
2. *TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)*
3. *Train2success.com*

References:

1. *Objective English For Competitive Exams, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.*
2. *Technical Communication by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.*
3. *Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/Cambridge University Press.2012.*
4. *Soft Skills for Everyone, Butterfield Jeff, Cengage Publications, 2011.*
5. *Practice Psychometric Tests: How to familiarize yourself with genuine recruitment tests, 2012.*
6. *Management Shapers Series by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.*
7. *Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.*
8. *English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.*
9. *Word Power Made Handy, Shalini Verma, S Chand Publications, 2011.*
10. *Effective Technical Communication, Ashrif Rizvi, TataMcGrahill, 2011.*

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(13A52702) MANAGEMENT SCIENCE

Course Objective:

The objectives of this course are to equip the student the fundamental knowledge of Management Science and its application to effective management of human resources, materials and operations of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.

Learning outcome:

This course enables the student to know the principles and applications of management knowledge and exposure to the latest developments in the field. This helps to take effective and efficient managerial decisions on physical and human resources of an organization. Besides, the knowledge of Management Science facilitates for his/her personal and professional development.

UNIT I

INTRODUCTION TO MANAGEMENT

Definition of Management- Function of Management- Management as a Science and Art-Management as a Profession- Universality of Management- Henri Faylo's Administrative Theory –Elton Mayo's Human Relations Movement- Systems theory – Contingency theory- Monetary and non-monetary incentives to motivate work teams- Leadership –Definition- Qualities of successful leaders- Different leadership styles.

UNIT II

ORGANIZATION DESIGN AND STRUCTURE

Organization design and structure- Principles—Types of organization structure-Mechanic and Organic Structures- Line organization- Line & Staff organization- Functional Organization – Matrix organization structures- merits and demerits- Departmentation and Decentralization-Power and Authority- Delegation of authority-Principles for effective delegation of authority.

UNIT III

HUMAN RESOURCE AND MATERIALS MANAGEMENT

Concept of HRM-functions – Human Resource Planning-Job Analysis-Recruitment and Selection-Training and Development- Performance appraisal –methods- Wage and Salary Administration-Grievances handling Procedure-Material Management- Need for Inventory control- Economic order quantity- ABC analysis- Management of purchase, stores and stores records.-Marketing Management – Concept- Channels of distribution- Marketing mix and product mix.

UNIT IV

MANAGEMENT OF OPERATIONS & PROJECT MANAGEMENT

Nature of organizational control- Marketing control- HR control- effective control systems- Operations Management- Essentials of operations management- Trends in operational management- Designing operation system for effective management of an organization-Project Management –Network Analysis-PERT and CPM-Project crashing (Simple problems)

UNIT V

CONTEMPORARY MANAGEMENT ISSUES

Strategic Management-Concept- Mission-Vision-Core values-Setting objectives-Corporate planning – Environmental scanning-SWOT analysis- Steps in strategy formulation & implementation- Management

Information System (MIS)- Enterprise Resource Planning (ERP)-Just-in-Time (JIT)- Total Quality Management (TQM) – Supply Chain Management-Six Sigma-Business Process Outsourcing (BPO).

Text Books:

1. *Stoner, Freeman, Gilbert, Management, Pearson, Six Edition 2008*
2. *Aryasri: Management Science, Fourth Edition TMH, 2012.*

Reference Books:

1. Vijay Kumar & Apparo, Introduction to Management Science, Cengage, 2011.
2. Kotler Philip & Keller Kevin Lane: Marketing Management, 14th Edition, Pearson, 2012.
3. Aswathappa, Human Resource Management, Himalaya, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2011.
5. Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2012.
6. Joseph M Putti, Management Principles, Mc Millan Publishers, 2012.

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

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(13A04701) VLSI DESIGN

Course Outcomes:

- Complete Knowledge about Fabrication process of ICs
- Able to design VLSI circuits as per specifications given.
- Capable of optimizing the design of Arithmetic / logic building Blocks at all levels of Design /Fabrication.
- Can implement circuit through various design styles (semi- Custom, Full Custom)

UNIT-I

Introduction: Basic steps of IC fabrication, PMOS, NMOS, CMOS &BiCMOS, SOI process technologies, MOS transistors - MOS transistor switches – Basic gate using switches, working polar transistor Resistors and Capacitors.

Basic Electrical Properties of MOS and BiCMOS Circuits: Working of MOS transistors – threshold voltage; MOS design equations: I_{ds}–V_{ds} relationships, Threshold Voltage, Body effect, Channel length modulation , g_m, g_{ds}, figure of merit ω_0; Pass transistor, NMOS Inverter, CMOS Inverter analysis and design, Various pull ups loads, Bi-CMOS Inverters.

UNIT-II

Basic Circuit Concepts: Capacitance, resistance estimations- Sheet Resistance R_s, MOS Device Capacitances, routing Capacitance, Analytic Inverter Delays, Driving large Capacitive Loads, Fan-inand fan-out.

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, Scaling of MOS circuits, Limitations of Scaling.

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, Counters, High Density Memory Elements.

VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

UNIT-V

VHDL Synthesis: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout,Design capture tools, Design Verification Tools.

Test and Testability: Fault-modelling and simulation, test generation, design for testability, Built-inself-test.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, "Essentials of VLSI circuits and systems", PHI, 2013 Edition.
2. K.Lal Kishore and V.S.V. Prabhakar, "VLSI Design", IK Publishers

REFERENCES:

1. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 1999.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 1997.
3. John P. Uyemura, "Chip Design for Submicron VLSI: CMOS layout and Simulation", ThomsonLearning.
4. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John wiley, 2003.
5. John M. Rabaey, "Digital Integrated Circuits", PHI, EEE, 1997.

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(13A04702) OPTICAL FIBER COMMUNICATION

Course Outcomes:

- Analyze the performance of both digital and analog optical fiber systems
- Calculate the system bandwidth, noise, probability of error and maximum usable bit rate of adigital fiber system
- Calculate the system link loss, distortion and dynamic range of an RF photonic link
- To perform characteristics of fiber sources and detectors, design as well as conduct experimentin software and hardware, and analyze the results to provide valid conclusions.
- To learn the various optical source materials, LED structure, quantum efficiency, laser diodes.

UNIT-I

Introduction to Optical Fibers: Evolution of fiber optic system- Element of an Optical FiberTransmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of CircularWave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Modefibers-Graded Index fiber structure.

UNIT-II

Signal Degradation Optical fibers: Attenuation – Absorption losses, Scattering losses, BendingLosses, Core and Cladding losses, Signal Distortion in Optical Wave guides - Information Capacitydetermination –Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SMfibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-ModeCoupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT-III

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures –Lightsource materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modesand Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensingschemes, Fiber –to- Fiber joints, Fiber splicing.

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 –preamplifiers, Error Sources –Receiver Configuration – Probability of Error – Quantum Limit.

UNIT-V

System Design and Applications: Design of Analog Systems: system specification, power budget, bandwidth budget

Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity.

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, 2009.

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(13A04704) DIGITAL IMAGE PROCESSING
(CBCC-II)

Course Outcomes:

- Able to apply the Image processing concept for various fields of engineering and real life toprocess as per needs &specifications.
- Get the skills to heuristically develop new techniques to process images of any context.
- Can experiment, analyze & interpret imagedata /processing data.

UNIT–I

Introduction to Digital Image processing – Example fields of its usage- Image sensing andAcquisition – image Modeling - Sampling, Quantization and Digital Image representation – Basicrelationships between pixels, - Mathematical tools/ operations applied on images - imaging geometry.

UNIT–II

2D Orthogonal and Unitary Transforms and their properties - Fast Algorithms - Discrete FourierTransform - Discrete Cosine Transforms- Walsh- Hadamard Transforms- Hoteling Transforms ,Comparison of properties of the above.

UNIT–III

Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement infrequency Domain, Image smoothing, Image sharpening, Colour image Enhancement

UNIT–IV

Degradation model, Algebraic approach to restoration – Inverse filtering – Least Mean Square filters,Constrained Least square restoration. Blind DeconvolutionImage segmentation: Edge detection -,Edgelinking, Threshold based segmentation methods – Regionbased Approaches - Template matching –use of motion in segmentation

UNIT–V

Redundancies in Images - Compression models, Information theoretic perspective-Fundamentalcoding theorem. Huffman Coding, Arithmetic coding, Bit plane coding, Run length coding, Transformcoding, 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 usingMATLAB”, Tata McGraw Hill, 2010.
2. S jayaraman, S Esakkirajan, T Veerakumar, “Digital Image processing”, Tata McGraw Hill.
3. William K. Pratt, “Digital Image Processing”, John Wilely, 3rd Edition, 2004.

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(13A02605) NEURAL NETWORKS & FUZZY LOGIC
(CBCC-II)

Course Outcome:

After completion of the course the students will be able to

- Get an overview of different types of neural network models.
- Understand the functioning of single; multi-layer feed forward neural networks, associative memories and their rules and algorithms.
- Understand about fundamentals of fuzzy logic, their rules and applications.

UNIT I

Introduction to Neural Networks: Biological neuron, McCulloh-pitts neuron model, Neuron Modellingfor Artificial Neural Systems, Models of Artificial Neural Networks-feed forward and feedbacknetworks, Neural Processing, Learning as approximation, Supervised and unsupervised learning,Neural Network Learning rules- Hebbian, Perceptron, Delta, Widrow-Hoff, Correlation, Winner-Take-All learning rules.

UNIT II

Single-Layer Neural Networks: Classification Model, Features and Decision Regions, DiscriminantFunctions, Linear Machine and Minimum Distance Classification, Training and Classification usingDiscrete Perceptron, Single-Layer Continuous Perceptron Networks, Multicategory Single-LayerPerceptron Networks, Hopfield Network – Discrete-time, Gradient type.Multi-Layer Neural Networks: Linearly Nonseparable Pattern Classification, Delta Learning Rule forMultiperceptron Layer, Generalized Delta Learning Rule, Feed forward Recall and Error Back propagation training, Learning Factors.

UNIT III

Associative Memories: Basic concepts, Linear Associator, Recurrent Auto associate Memory, Performance Analysis of Recurrent Auto associate Memory, Bidirectional Associate Memory (BAM):Memory Architecture, Association Encoding and Decoding, Stability Considerations, MemoryExample and Performance Evaluation, Improved coding of memories, MultidirectionalAssociativeMemory, Associative Memory of Spatio-Temporal Patterns.

UNIT IV

Fuzzy Set– Introduction: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory andoperations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT V

Fuzzy Logic - Fuzzy Membership, Rules: Membership functions, interference in fuzzy logic, fuzzy ifthenrules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, FuzzyController, Industrial applications.

Text Books:

1. JacekM.Zurada," Introdution to Artificial Neural Systems", West Publishing Company
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", Wiley Indian 3rd Edition

Reference Books:

1. George J.Klir/Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and applications", Prentice-HallEdition
2. S.N.Sivanandam, S.Sumathi, S.N.Deepa, "Introduction to Neural Networks using MATLAB6.0", TMH, 2006.
3. S.N.Sivanandam, S.Sumathi, S.N.Deepa, "Introduction to Fuzzy Logic using MATLAB 6.0",TMH, 2006
4. Simon Haykins, "Neural Networks", Pearson Education.

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(13A04705) SPREAD SPECTRUM TECHNIQUES
(CBCC-II)

Course Outcomes:
At the end of the course the students should be able to:

- Understand the general concepts of spread spectrum techniques.
- Generate spread spectrum signals through hardware and computer simulations.
- Know various applications of spread spectrum techniques and working operation of CDMA systems of 2G and 3G standards.

UNIT – I
Fundamentals of Spread Spectrum: General concepts, Direct sequence (DS), Bi-phase and quadriphasemodulations, Pseudo noise (PN) signal characteristics, Direct Sequence receiver, FrequencyHopping – transmitter, receiver, Time Hopping, Comparison of modulation methods.

UNIT – II
Analysis of Direct-Sequence & Avoidance type Spread Spectrum Systems: Properties of PN sequences, Properties of m-sequences, Partial Correlation, PN signals from PN sequences, Partialcorrelation of PN signals, Generation of PN signal, Despreading the PN signal, Interference rejection,Output Signal – to – Noise ratio, Antijam characteristics, Interception, Energy and Bandwidthefficiency. The frequency hopped signal, Interference rejection in a Frequency – Hopping receiver,The Time-Hopped Signal.

UNIT – III
Generation and Detection of Spread Spectrum Signals: Shift register sequence generators, Discrete-Frequency Synthesis, Saw device PN generators, Charge coupled devices, Coherent Direct – sequencereceivers, Other methods of carrier tracking, Delay lock loop analysis, Tau-Dither loop, Coherentcarrier tracking, Non-coherent frequency hop receiver, Acquisition of Spread Spectrum Signals,Acquisition by cell-by-cell searching, Reduction of Acquisition time, Acquisition with matched filter,Matched filters for PN sequences, Matched filters for Frequency Hopped signals, Matched filters withacquisition aiding waveforms.

UNIT – IV
Application of Spread Spectrum to Communications: General characteristics of Spread spectrum,Multiple access considerations – number of active users (equal powers), number of active users(unequal powers), bandwidth limited channels, power limited channels, Energy and bandwidthefficiency in multiple access, Selective calling and identification, Antijam

considerations, Jammingdirect-sequence systems, Jamming Frequency – Hopping Systems, Intercept considerations.

UNIT – V

CDMA Digital Cellular Systems: Introduction, Cellular radio concept, CDMA Digital cellular systems,Specific examples of CDMA digital cellular systems based on 2G, and 3G standards and theirtechnical specifications.

TEXT BOOKS:

1. George. R. Cooper and Clare D. McGillem, "Modren Communications and Spread Spectrum",
McGraw – Hill Book Company, 1986.
2. Roger L. Peterson, Rodger E. Ziemer& David E. Borth, "Introduction to Spread Spectrum Communications", McGraw Hill, 2011.

REFERENCES:

1. Dr. KamiloFeher, "Wireless Digital Communications – Modulation & Spread Spectrum Applications", PHI, 1999.
2. T. S. Rappaport, "Wireless Communications – Principles and Practice," PHI, 2001.
3. Simon Haykin, "Communication Systems" 4th edition
4. Andrea Goldsmith "Wireles Communications", Cambridge University Press, 2005

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(13A04706) WIRELESS COMMUNICATION
(CBCC-III)

Course Objective:

- To understand basics of Wireless Communications and its evolution process.
- To learn about the mechanism of radio mobile propagation and its effects.
- To understand various types of diversity and equalization techniques to counter balance the effects of Wireless Channel.
- To Study about importance of Wireless Networking and multiple access techniques in the present day mobile communications
- To design and analyze mobile systems using OFDM technology for mitigating the ISI effects at higher data rates.

Course Outcome:

After completion of this course the students will be able to

- Understand basics of Wireless Communications and its evolution process.
- Know about the mechanism of radio mobile propagation and its effects.
- Apply various types of diversity and equalization techniques to counter balance the effects of Wireless Channel.
- Recognize the importance of Wireless Networking and multiple access techniques in the present day mobile communications
- Analyze and design mobile systems using OFDM technology for mitigating the ISI effects at higher data rates.

UNIT – I

Introduction to Wireless Communication Systems&Cellular Concept:
Evolution of Mobile Radio Communication Systems, Examples of Wireless CommunicationSystems, 1G, 2G, 2.5G, and 3G Wireless Cellular Networks and Standards, Frequency Reuse
Concept, Channel Assignment Strategies, Interference and System Capacity, Trunking andGrade of Service, Improving Coverage and Capacity in Cellular Systems, Problem Solving.

UNIT - II
Mobile Radio Propagation:
Large Scale Path Loss: Introduction, Free Space Propagation Model, PropagationMechanisms – Reflection, Diffraction, and Scattering, Practical Budget Design using PathLoss Models, Outdoor Propagation Models, Indoor Propagation Models.Small Scale Fading and Multipath: Small Scale Multipath Propagation, Impulse ResponseModel of

a Multipath Channel, Small Scale Multipath Measurements, Parameters of MobileChannels, Types of Small Scale Fading (all variations), Statistical Models – Clarke's Modelfor Flat Fading, Jake's Model, Level Crossing Rate, Simulation of Clarke's/Jake's Model,Two Ray Rayleigh Fading Model, Problem Solving.

UNIT - III

Equalization & Diversity Techniques:

Equalization: Survey of Equalization Techniques, Linear and Non-linear Equalizers – Linear Transversal Equalizer, Decision Feedback Equalizer (DFE), Algorithms for AdaptiveEqualization – Zero Forcing, LMS, RLS, Fractionally Spaced Equalizers.Diversity Techniques: Realization of Independent Fading Paths, Receiver Diversity –System Model, Selection Combining, Threshold Combining, Maximal Ratio Combining,Rake receiver, Equal Gain Combining, Transmit Diversity–Channel known at Transmitter,Channel unknown at Transmitter – the Alamouti Scheme, analysis.

UNIT – 1V

Multiple Access Techniques & Networking:

Introduction to Multiple Access: FDMA, TDMA, CDMA, SDMA, Packet Radio, Capacity of Cellular Systems, Problem Solving.

Introduction to Wireless Networking: Introduction to Wireless Networks, Differencesbetween Wireless and Fixed Telephone Networks, Development of Wireless Networks,Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling.

UNIT - V

Multicarrier Modulation:

Data Transmission using Multiple Carriers, Multicarrier Modulation with OverlappingSubchannels, Discrete Implementation of Multicarrier Modulation, The Cyclic Prefix,Orthogonal Frequency Division Multiplexing (OFDM), Matrix Representation of OFDM,Vector Coding, Challenges in Multicarrier Systems, Problem Solving.

References:

1. T. S. Rappaport, "Wireless Communications, Principles and Practice," Prentice Hall, 2nd Edition, 2002
2. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005.
3. David Tse, PramodViswanath, "Fundamentals of Wireless Communications,"Cambridge University Press, 2006.
4. Dr. KamiloFeher, "Wireless Digital Communications," Prentice Hall, 1995.

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(13A04707) OPERATING SYSTEMS
(CBCC-III)

Course Objective:

• To make the students understand the basic operating system concepts such as processes,threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystemsand protection.

• To get acquaintance with the class of abstractions afford by general purpose operating systemsthat aid the development of user applications.

Course Outcome:

•Able to use operating systems effectively.
•Write System and application programs to exploit operating system functionality.
•Add functionality to the exiting operating systems
•Design new operating systems

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operatingsystems Operations, protection and security, Kernel data Structures, Computing Environments, Open-Source Operating Systems

Operating System Structure: Operating System Services, User and Operating-System Interface, systemscalls, Types of System Calls, system programs, operating system structure, operating system debugging,System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication,Examples of IPC systems.

UNIT II

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicitthreading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson‘s Solution, Synchronization Hardware,Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples,Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-ProcessorScheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of thepage table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-MappedFiles, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlockprevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Diskscheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File systemmounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requeststo Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix,Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Basedsystems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as asecurity tool, User authentication, Implementing security defenses, Firewalling to protect systems andnetworks, Computer–security classifications.

Text Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Ninth Edition,2012, Wiley.

Reference Books:

1. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, McGraw Hill.
8. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.

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(13A04708) SATELLITE COMMUNICATION
(CBCC-III)

Course Outcomes:

- Students can determine the location of Satellite.
- Students can design Satellite Uplink and Downlink.
- Students can design earth station transmitter, receiver and antenna systems.

UNIT I

INTRODUCTION:

Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

ORBITAL MECHANICS AND LAUNCHERS:

Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT II

SATELLITE SUBSYSTEMS:

Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

UNIT III

SATELLITE LINK DESIGN:

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.

MULTIPLE ACCESS:

Frequency division multiple access (FDMA) Inter modulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and reception.

UNIT IV

EARTH STATION TECHNOLOGY:

Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS:

Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs

UNIT V

SATELLITE NAVIGATION & THE 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. Satellite communications-Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley publications, 2nd Edition, 2003.
2. Satellite communications Engineering-Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:

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

4. Learn and understand how to configure the PWM and ADC modules of the MSP-EXP430G2 Launchpad to control the DC motor using external analog input.

Exercises:

a) Observe the PWM waveform on a particular pin using CRO.
b) What is the maximum resolution of PWM circuitry in MSP430G2 Launchpad and how it can be achieved using program?
c) Create a PWM signal of 75% duty cycle on particular PWM pin.
d) Create Switch case code from the example code to run the DC Motor in 3 set of speeds.

5. Understand the ULP Advisor capabilities and usage of ULP Advisor to create optimized, power-efficient applications on the MSP-EXP430G2 Launchpad.

Exercises:

a) How does the ULP Advisor software help in designing power-optimized code?
b) Which ULP rule violation helps us to detect a loop counting violation?

6. Understand and Configure 2 MSP430F5529 Launchpads in master-slave communication mode for SPI protocol.

Exercises:

a) Which port pins of MSP430 can be configured for SPI communication?
b) What is the data transfer rate supported by MSP430 for SPI communication?

7. A basic Wi-Fi application: Configure CC3100 Booster Pack connected to MSP430F5529 Launchpad as a Wireless Local Area Network (WLAN) Station to send Email over SMTP.

Exercises:

a) Identify the code that helps in establishing connection over SMTP. Modify the code to trigger E-mail application based upon external analog input.
b) How to configure the AP WLAN parameters and network parameters (IP addresses and DHCP parameters) using CC3100 API.

8. Understand Energy Trace Technology analysis tool that measures and displays the application's energy profile. Compute and measure the total energy of MSP-EXP430G2 Launchpad running an application and estimate the lifetime of an AA battery if the Launchpad is powered using standalone AA battery.

Exercises:

Compute the energy measurement and the estimated lifetime of a battery in various low power modes.

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B.Tech IV-I sem (E.C.E) **L C**

4 2

(13A04710) MICROWAVE & OPTICAL COMMUNICATIONS LABORATORY

Course Outcomes:

- Capable of Applying microwave Concepts/ Microwave components and test them.
- Able to design and analyse an optical fiber communications link

Microwave Lab (PART – A) --- Any Seven (7) 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. Impedance Matching and Tuning
9. Scattering parameters of Magic Tee.
10. Radiation Pattern Measurement of horn Antennas (at least two antennas).

Optical Fiber Lab (PART – B) --- Any five (5) Experiments

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of Data rate for Digital Optical link.
5. Measurement of Numerical Aperture of the given fiber.
6. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Regulated Klystron Power Supply 6 nos.
2. VSWR Meter 6 nos.
3. Milli/Micro Ammeters 10 nos.
4. Multi meters 10 nos.
5. CROs 8 nos.
6. GUNN Power Supply, Pin Moderator 4 nos.
7. Relevant Microwave components --
8. Fiber Optic Analog Trainer based LED 3 nos.
9. Fiber Optic Analog Trainer based laser 2nos.
10. Fiber Optic Digital Trainer 1 no.
11. Fiber cables - (Plastic, Glass)

EMBEDDED SYSTEMS

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

Modern day Embedded Systems curriculum requires an application and Systems Design approach balancing the low power needs, performance, connectivity requirements and system cost. This course is designed to inculcate this perspective in the students while introducing them to Microcontrollers usingMSP430, an industry standard hardware platform.

The course helps us to understand 16-bit architecture and its programming considerations using C language. Later part is focused on programming various inbuilt features of the platform with more focused approach on analog and digital interfacing concepts and related protocols.The considerations in keeping the System power consumption low are addressed along the way. Embedded systems whether they are standalone or networked need various communication interfaces and standards so that they communicate and process data from external sensors and actuators.It will cover how to connect the device to external peripherals including those needed for internet connectivity.

Course objective:

Teach basic architecture of 16-bit microcontrollers

Understand hardware interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.

Reviews and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world.

Understanding Embedded Networking concepts based upon connected MCUs.

UNIT-I: Introduction to Embedded systems

Embedded system overview, applications, features and architecture considerations-ROM, RAM, timers, data and address bus, I/O interfacing concepts, memory mapped I/O.CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture, instruction set, instruction formats, and various addressing modes of 16-bit microcontroller.

Introduction ARM architecture and Cortex – M series, Introduction to the Tiva family viz. TM4C123x & TM4C129x and its targeted applications, Tiva block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

Introduction to the MSP430 family viz. MSP430x2x, MSP430x4x etcand its targeted applications, Study of sample embedded system on 16-bit MSP430 microcontroller.MSP430 block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

UNIT-II: Microcontroller Fundamentals for Basic Programming

I/O pin multiplexing& its relevance, pull up/down registers, GPIO control, Memory Mapped Peripherals, programming System registers, Watchdog Timer.Need of low power for embedded systems, system clocks and Low power modes, Low Power aspects of a microcontroller:

MSP430,Active vs Standby current consumption, FRAM vs Flash for low power& reliability.Introduction to Interrupts, Interrupt vector table, interrupt programming.
Case Study: MSP430 based embedded system application bringing up the salient features of GPIO, Watchdog timer, low power, FRAM etc.
Advance Topics : Running MSP430 on harvested energy

UNIT-III:Timers, PWM and Mixed Signals Processing
Timer Basic, Timer & Real Time Clock (RTC), Timing generation and measurements,Analog interfacing and data acquisition: ADC. Inbuilt- features of MSP430 like ADC and Comparator configuration, DMA for data transfer, Comparator, PWM control, its configuration.
Power considerations: Programming for optimal power consumption while using peripherals, Using MSP430 peripheral intelligence in power management
Case Study: MSP430 based embedded system application using ADC & PWM demonstrating peripheral intelligence. "Remote Controller of Air Conditioner Using MSP430"

UNIT-IV: Communication protocols and Interfacing with external devices
Synchronous/Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, I2C protocol, SPI protocol& UART protocol. Implementing and programming I2C, SPI& UART interface using MSP430
Case Study: MSP430 based embedded system application using the interface protocols for communication with external devices: "A Low-Power Batteryless Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID"

UNIT-V: Embedded Networking and Internet of Things
IoT overview and architecture, Overview of wireless sensor networks and design examples. Various wireless protocols and its applications: NFC, ZigBee , Bluetooth, Bluetooth Low Energy, Wi-Fi.
Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi,User APIs for Wireless and Networking applications Building IoT applications using CC3100 user API: connecting sensor devices
Case Study: MSP430 based Embedded Networking Application: "Implementing Wi-Fi Connectivity in a Smart Electric Meter"

TEXT BOOKS:

1. John Davies, "MSP430 Microcontroller Basics", Newnes, 1ST Edition.

Note: Complete list of text books will be communicated by the University in due course of time.

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VLSI & EMBEDDED SYSTEMS LAB

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

Note: The VLSI experiments stay same as current. Embedded System experiments are replaced by below list

Embedded Systems Lab:

Experiments are based upon MSP 430/ARM Processors

1. Interfacing and programming GPIO ports in C (blinking LEDs , push buttons)
2. Usage of Low Power Modes:
   Use MSPEXP430FR5969 as hardware platform and demonstrate the low power modes and measure the active mode and standby mode current.
3. Interrupt programming examples through GPIOs
4. PWM based Speed Control of Motor controlled by potentiometer connected to GPIO
5. Using ULP advisor in Code Composer Studio
6. Master Slave Communication between 2 MSP430s using SPI
7. A basic Wi-Fi application –Communication between two sensor nodes
8. Compute Total Energy of an application [experiment 4 or experiment 7] and Estimated life time of a battery

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(13A04801) ADAPTIVE SIGNAL PROCESSING

Course Objective:

- To study in detail about adaptive Systems.
- To study about various Linear optimum filtering techniques.
- To study about various techniques related Linear and Non Linear adaptive filtering.

Course outcome:

After the course students is expected to be able to:

- Get complete knowledge regarding adaptive systems
- Design various Linear optimum filters by employing different techniques associated withthem
- Understand various techniques related to with Linear and Non linear adaptive filtering and their design considerations

UNIT I:

Introduction to Adaptive Systems: Eigen Analysis - Eigen Value problem, Properties of eigen values and eigen vectors, Eigen filters, Eigen value computations, Adaptive Systems - Definitions, Characteristics, Applications and Examples of Adaptive systems, The adaptive linear combiner – Description, weight vectors, Desired response performance function, Gradient and Mean square error(MSE).

UNIT II:

Linear Optimum Filtering: Wiener Filters – Linear optimum filtering, Principle of Orthogonality, Wiener-Hopf equations, Error performance surface, Channel Equalization, Linearly constrained minimum variance filter, Linear Prediction – Forward and Backward linear prediction, Levinson-Durbin Algorithm, Properties of prediction error filters, AR modeling of stationary stochastic process, Lattice predictors, Joint process estimation, Kalman Filters - Recursive mean square estimation for scalar random variables, Kalman filtering problem, The innovations process, Estimation of the state using innovations process, Filtering, Initial conditions, Variants of the Kalman filter, Extended Kalman filter, Problem Solving.

UNIT III:

Linear Adaptive Filtering-I: Method of Steepest descent algorithm and its stability, Least Means Square (LMS) algorithm – Structure & operation of LMS algorithm, Examples, Stability & performance analysis of the LMS algorithm, Simulations of Adaptive equalization using LMS algorithm, Convergence aspects, Method of Least Squares (LS) - Statement, Data

windowing, Minimum sum of error squares, Normal equations and linear least squares filters, Properties.

UNIT IV:

Linear Adaptive Filtering-II Recursive Least Squares (RLS) Algorithm – Matrix inversion lemma, The exponentially weighted RLS algorithm, Update recursion for the sum of weighted error squares, Example, Convergence Analysis, Simulation of adaptive equalization using RLS algorithm, Order Recursive Adaptive Filters – Adaptive forward and backward linear prediction, Least squares Lattice predictor, QR-Decomposition based Least squares Lattice filters & their properties, Simulation of Adaptive equalization using Lattice Filter.

UNIT V:

Non linear Adaptive Filtering: Blind deconvolution – Theoretical and practical considerations, Bussgang algorithm for blind equalization for real base band channels, Special cases of Bussgang algorithm, Simulation studies of Bussgang algorithms, SVD, Problem solving.

Text Books:

1. Simon Haykin, "Adaptive Filter Theory," Prentice Hall, 4th Edition, 2002.
2. Bernard Widrow, Samuel D. Strearns, "Adaptive Signal Processing," Prentice Hall, 2005.

References:

1. Paulo S.R. Diniz, Adaptive Filtering Algorithms and Practical Implementation, Third Edition,Springer, Kluwer Academic Publishers.
2. Alexander D Poularikas, Zayed M Ramadan, Adaptive Filtering Primer with MATLAB, CRC Press Taylor & Francis Group, 2008 Indian Edition.
3. Ali H. Sayed, Adaptive filters, IEEE Press, Wiley-Interscience, A john Wiley & Sons, INC.,Publication. 4. S. Thomas Alexander, "Adaptive Signal Processing-Theory & Applications," Springer –Verlag, 1986

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(13A04802) ADVANCED 3G & 4G WIRELESS COMMUNICATIONS

UNIT-I

Wireless Communications and Diversity:

Introduction to 3G/4G Standards, Wireless Channel and Fading, Rayleigh Fading and BER of Wired Communication, BER for Wireless Communication, Introduction to Diversity, Multi-antenna Maximal Ratio Combiner, BER with Diversity, Spatial Diversity and Diversity Order,

UNIT-II

Broadband Wireless Channel Modelling: Wireless Channel and Delay Spread, Coherence Bandwidth of the Wireless Channel, ISI and Doppler in Wireless Communications, Doppler Spectrum and Jakes Model,

Cellular Communication:Introduction to Cellular Communications, Frequency reuse, Multiple Access Technologies, Cellular Processes - Call Setup, Handover etc., Teletraffic Theory.

UNIT-III

CDMA: Introduction to CDMA, Walsh codes, Variable tree OVSF, PN Sequences, Multipath diversity, RAKE Receiver, CDMA Receiver Synchronization.

OFDM: Introduction to OFDM, Multicarrier Modulation and Cyclic Prefix, Channel model and SNR performance, OFDM Issues – PAPR, Frequency and Timing Offset Issues.

UNIT-IV

MIMO: Introduction to MIMO, MIMO Channel Capacity, SVD and Eigenmodes of the, MIMO Channel , MIMO Spatial Multiplexing – BLAST, MIMO Diversity – Alamouti, OSTBC, MRT, MIMO - OFDM.

UWB (Ultra wide Band): UWB Definition and Features, UWB Wireless Channels, UWB Data Modulation, Uniform Pulse Train, Bit-Error Rate Performance of UWB.

UNIT-V

3G and 4G Wireless Standards-GSM, GPRS, WCDMA, LTE, WiMAX

Text Books:

1. Principles of Modern Wireless Communication Systems-Aditya K. Jagannatham, Publisher-McGraw Hill..
2. Fundamentals of Wireless Communications – David Tse and PramodViswanath, Publisher - Cambridge University Press.
3. Wireless Communications: Andrea Goldsmith, Cambridge University Press.

References:

1. Wireless Communications: Principles and Practice –Theodore Rappaport - Prentice Hall.
2. MIMO Wireless Communications – EzioBiglieri – Cambridge University Press.

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(13A04803) ADVANCED DIGITAL SIGNAL PROCESSING- MULTIRATE & WAVELET

UNIT – I

A Beginning with some practical situations, which call for multi-resolution/ multi-scale analysis - and how time-frequency analysis and wavelets arise from them. Examples: Image Compression, Wideband Correlation Processing, Magnetic Resonance Imaging, Digital CommunicationPiecewise constant approximation - the Haar wavelet, Building up the concept of dyadic Multi-resolution Analysis (MRA), Relating dyadic MRA to filter banks.

UNIT – II

A review of discrete signal processing, Elements of multi-rate systems and two-band filter bank design for dyadic wavelets.Families of wavelets: Orthogonal and bi-orthogonal wavelets, Daubechies' family of wavelets in detail, Vanishing moments and regularity, Conjugate Quadrature Filter Banks (CQF) and their design, Dyadic MRA more formally, Data compression - fingerprint compression standards, JPEG-2000 standards.

UNIT – III

The Uncertainty Principle: and its implications: the fundamental issue in this subject - the problem and the challenge that Nature imposes.The importance of the Gaussian function: the Gabor Transform and its generalization; time, frequency and scale - their interplay, The Continuous Wavelet Transform (CWT), Condition of admissibility and its implications. Application of the CWT in wideband correlation processing.

UNIT – IV

Journey from the CWT to the DWT: Discretization in steps, Discretization of scale - generalized filter bank, Discretization of translation - generalized output sampling, Discretization of time/ space (independent variable) - sampled inputs, Going from piecewise linear to piecewise polynomial, The class of spline wavelets - a case for infinite impulse response (IIR) filter banks, Variants of the wavelet transform and its implementation structures, the wave packet transform, Computational efficiency in realizing filter banks - Polyphase components, The lattice structure, The lifting scheme.

UNIT – V

An exploration of applications (this will be a joint effort between the instructor and the class). Examples: Transient analysis; singularity detection; Biomedical signal processing applications; Geophysical signal analysis applications; Efficient signal design and realization: wavelet based modulation and demodulation; Applications in mathematical approximation; Applications to the solution of some differential equations; Applications in computer graphics and computer vision; Relation to the ideas of fractals and fractal phenomena.

Textbooks:

1. Howard L. Resnikoff, Raymond O.Wells, “Wavelet Analysis: The scalable Structure Information,” Springer, 1998 available in India edition.
2. K. P. Soman, K. I. Ramachandran, "Insight Into Wavelets - From Theory to Practice", Prentice Hall of India, Eastern Economy Edition, Prentice Hall of India Private Limited, M-97, Connaught Circus, New Delhi - 110 001, Copyright 2004, ISBN Number 81-203-2650-4.
3. Michael W. Frazier, “An Introduction to Wavelets through Linear Algebra”, Springer, ISBN 3-540-780-75-0, c 1999.
4. P. P. Vaidyanathan, “Multirate Systems and Filter Banks”, Pearson Education, Low Price Edition, ISBN 81 – 7758 – 942 – 3.

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(13A04804) RF INTEGRATED CIRCUITS

UNIT – I

Introduction RF systems – basic architectures, Transmission media and reflections, Maximum power transfer , Passive RLC Networks, Parallel RLC tank, Q, Series RLC networks, matching, Pi match, T match, Passive IC Components Interconnects and skin effect, Resistors, capacitors Inductors

UNIT – II

Review of MOS Device Physics - MOS device review, Distributed Systems, Transmission lines, reflection coefficient, the wave equation, examples, Lossy transmission lines, Smith charts – plottingGamma, High Frequency Amplifier Design, Bandwidth estimation using open-circuit time constants, Bandwidth estimation, using short-circuit time constants, Rise time, delay and bandwidth, Zeros to enhance bandwidth, Shunt-series amplifiers, tuned amplifiers, Cascaded amplifiers

UNIT - III

Noise - Thermal noise, flicker noise review, Noise figure, LNA Design, Intrinsic MOS noise parameters, Power match versus, noise match, large signal performance, design examples & Multiplier based mixers. Mixer Design, Subsampling mixers.

UNIT – IV

RF Power Amplifiers, Class A, AB, B, C amplifiers, Class D, E, F amplifiers, RF Power amplifier design examples, Voltage controlled oscillators, Resonators, Negative resistance oscillators, Phase locked loops, Linearized PLL models, Phase detectors, charge pumps, Loop filters, and PLL design examples

UNIT - V

Frequency synthesis and oscillators, Frequency division, integer-N synthesis, Fractional frequency, synthesis, Phase noise, General considerations, and Circuit examples, Radio architectures, GSM radio architectures, CDMA, UMTS radio architectures

Textbooks:

1. The design of CMOS Radio frequency integrated circuits by Thomas H. Lee Cambridge university press, 2004.
2. RF Micro Electronics by BehzadRazavi, Prentice Hall, 1997.

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(13A04805) PATTERN RECOGNITION & APPLICATION

UNIT – I

Introduction: Feature extraction and Pattern Representation Concept of Supervised and Unsupervised classification Introduction to Application Areas.

UNIT – II

Statistical Pattern Recognition

Bayes Decision Theory, Minimum Error and Minimum Risk Classifiers, Discriminant Function and Decision Boundary Normal Density, Discriminant Function for Discrete Features, Parameter estimation

UNIT – III

Dimensionality Problem

Dimension and accuracy, Computational Complexity, Dimensionality Reduction, Fisher Linear Discriminant, Multiple Discriminant Analysis

Nonparametric Pattern Classification

Density Estimation, Nearest Neighbour Rule, Fuzzy Classification

UNIT – IV

Linear Discriminant Functions Separability, Two Category and Multi Category Classification, Linear Discriminators, Perceptron Criterion, Relaxation Procedure, Minimum Square Error Criterion, Widrow-Hoff Procedure, Ho-Kashyap Procedure, Kesler's Construction.

Neural Network Classifier Single and Multilayer Perceptron, Back Propagation Learning, Hopfield Network, Fuzzy Neural Network

UNIT – V

Time Varying Pattern Recognition

First Order Hidden Markov Model, Evaluation, Decoding, Learning

Unsupervised Classification

Clustering, Hierarchical Clustering, Graph Based Method, Sum of Squared Error Technique Iterative Optimization

Textbooks:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", JohnWiley& Sons, 2001.
2. Earl Gose, Richard Johsonbaugh and Steve Jost, "Pattern Recognition and ImageAnalysis", Prentice Hall, 1999.

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B.Tech IV-II Sem (E.C.E)	**T**	**Tu**	**C**
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(13A04806) LINUX PROGRAMMING & SCRIPTING

Course Objectives:

- The goal of the course is the study of scripting languages such as PERL, TCL/TK , Python and BASH
- Creation of programs in the Linux environment
- The study of the principles of scripting languages
- The study of usage of scripting languages in IC design flow

Learning Outcomes:

- Ability to create and run scripts using Perl / TCL / Python in IC design flow Ability to use Linux environment and write programs for automation of scripts in VLSI tool design flow

UNIT 1

LINUX BASICS: Introduction to Linux , File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group , Permissions for file , directory and users, Searching a file & directory, zipping and unzipping concepts

UNIT 2

LINUX NETWORKING: Introduction to Networking in Linux, Network basics & tools, File transfer protocol in Linux, Network file system , Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.

UNIT 3

PERL SCRIPTING: Introduction to Perl Scripting ,Working with Simple Values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting ,References &Subroutines , Running and Debugging Perl, Modules, Object-Oriented Perl.

UNIT 4

TCL/ TK SCRIPTING: Tcl Fundamentals, String and Pattern Matching, Tcl Data Structures ,Control Flow Commands, Procedures and Scope , Evel, Working With UNIX, Reflection and Debugging, Script Libraries, Tk Fundamentals ,Tk by Examples, The Pack Geometry Manager, Binding Commands to X Events, Buttons and Menus, Simple Tk Widgets, Entry and Listbox Widgets Focus, Grabs and Dialogs

UNIT 5

PYTHON SCRIPTING : Introduction to Python, Using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.

References:

1. Instructor reference material

2. Python Tutorial by Guido van Rossum, and Fred L. Drake, Jr., editor, Release 2.6.4

3. Practical Programming in Tcl and Tk by Brent Welch , Updated for Tcl 7.4 and Tk 4.0

4. Teach Yourself Perl 5 in 21 days by David Till.