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 students 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

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	4	1 -	4
5.	13A04604	Electronic Measurements & Instrumentation	3	1 -	3
6.	13A04605	Microprocessors & Microcontrollers Lab	3	1 -	2
7.	13A04606	Digital Signal Processing Lab	-	- 3	2
8.	13A04607	Digital Communication Systems Lab	-	- 3	2
9.	13A52502	Advanced English Language Comm. skills Lab(Audit course)	-	- 3	-
Total Credits					22

B.Tech. IV - I Semester

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A52601	Management Science	3	1 -	3
2.	13A04701	VLSI Design	3	1 -	3
3.	13A04702	Optical Fibre Communication	3	1 -	3
4.	13A04703	Embedded Systems	3	1 -	3
5.		**Elective – I** (Open Elective)	3	1 -	3
6.	13A04704 13A04705 13A04706	**Elective-II** Digital Image Processing RADAR & Navigational Aids T.V Engineering	3	1 -	3
7.	13A04707	VLSI & Embedded Systems Lab	-	- 3	2
8.	13A04708	Microwave & Optical Communications Lab	-	- 3	2
Total Credits					22

B.Tech. IV - II Semester

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A04801	Mobile Communication	3	1 -	3
2.	13A04802	Computer Networks	3	1 -	3
3.	13A04803 13A04804 13A04805	**Elective-III** Satellite Communication Spread Spectrum Communication Multimedia Communication	3	1 -	3
4.	13A04806 13A04807 13A04808	**Elective-IV** Bio-Medical Instrumentation Speech Processing DSP Processors & Architectures	3	1 -	3
5.	13A04809	Seminar & Comprehensive Viva-voce	-	- -	3
6.	13A04810	Project work	-	- -	10
Total Credits					25

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.*

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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.*

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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**
3 4

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

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

(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**
	3	**1**	**3**

(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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(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.*

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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*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04503) LINEAR IC APPLICATIONS

Course Objective:

- *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 Outcome:

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.

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.

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.

Specialized applications: 555 timer IC (monostable & astable operation) & its applications, PLL, operating principles, Monolithic PLL, 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.*

Reference Books:

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04505) IC APPLICATIONS LAB

Course Objective:

- *To verify the applications of Op-amp*
- *To verify applications IC555 and IC566*
- *To use computer-aided design tools for development of complex digital logic circuits*
- *To model, simulate, verify, analyze, and synthesize with hardware description languages*
- *To design and prototype with standard cell technology and programmable logic*
- *To design tests for digital logic circuits, and design for testability*

Learning Outcome:

- *Able to verify applications of Op-amp*
- *Able to verify applications of IC555 and IC566*
- *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.*

Minimum Twelve Experiments to be conducted:
Part A (IC Application Lab):

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order).
3. Function Generator using OP AMPs.
4. IC 555 Timer – Monostable and Astable Operation Circuit.
5. IC 566 – VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 bit DAC using OP AMP.

Part B (ECAD Lab):
Simulate the internal structure of the following Digital IC's using VHDL / VERILOG and verify the operations of the Digital IC's (Hardware) in the Laboratory

1. Logic Gates- 74XX.
2. Half Adder, Half Subtractor, Full Adder, Full Subtractor & Ripple Carry Adder.
3. 3-8 Decoder -74138 & 8-3 Encoder- 74X148.
4. 8 x 1 Multiplexer -74X151 and 2x4 Demultiplexer-74X155.
5. 4 bit Comparator-74X85.
6. D Flip-Flop 74X74.
7. JK Flip-Flop 74X109.
8. Decade counter-74X90.
9. Universal shift register -74X194.

Equipment required for Laboratories:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components: - IC741, IC555, IC566, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04506) ANALOG COMMUNICATION SYSTEMS LAB

Course Objective:

- *To provide a real time experience for different analog modulation systems and demodulation schemes*
- *To provide exposure to the real time behavior of different elements available in analog communication system such as filters, amplifiers etc*
- *To perform radio receiver measurements and antenna measurements*

Learning Outcome:

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.*

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

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Characteristics of Mixer.
4. Pre-emphasis & de-emphasis.
5. Pulse amplitude modulation & demodulation.
6. Pulse width modulation & demodulation
7. Pulse position modulation & demodulation.
8. Radio receiver measurements – sensitivity selectivity and fidelity.
9. Measurement of half power beam width (HPBW) and gain of a half wave dipole antenna.
10. Measurement of radiation pattern of a loop antenna in principal planes.

Equipment required for the Laboratory:

1. Regulated Power Supply equipments 0 – 30 V
2. CROs 0 – 20 M Hz.
3. Function Generators 0 – 3 M Hz
4. RF Signal Generators 0 – 1000 M Hz
5. Multimeters
6. Required electronic components (active and passive) for the design of experiments from 1 - 7
7. Radio Receiver Demo kits or Trainers.
8. RF power meter frequency range 0 – 1000 MHz
9. Spectrum Analyzer
10. Dipole antennas (2 Nos.) 850 MHz – 1GHz
11. Loop antenna (1 no.) 850 MHz – 1GHz
12. Bread Boards

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A52501) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objective:
The objective of this course is 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.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04601) MICROPROCESSORS AND MICROCONTROLLERS

Course Objective:

- *To understand the architecture of 8086 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 Outcome:

- *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 Overview-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 PROGRAMMING 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*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04602) DIGITAL SIGNAL PROCESSING

***Course Objective**:*

- *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 Outcome**:*

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.*

Reference Books:

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - II Sem.	**Th**	**Tu**	**C**
	4	**1**	**4**

(13A04603) MICROWAVE ENGINEERING

***Course Objective**:*

- *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 Outcome**:*

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.*

Reference Books:

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.	**Th**	**Tu**	**C**
	3	**1**	**3**

(13A04604) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Objective:

- *To study about functioning of different meters associated with measurements of signal characteristics*
- *To study and employ CRO for measuring Signal characteristics*
- *To study in detail about different bridges employed for Electronic measurements*
- *To study working of advanced measuring instruments such as logic analyzers and spectrum analyzers*

Learning Outcome:

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.*

Reference Books:

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04605) MICROPROCESSORS & MICROCONTROLLERS LAB

***Course Objective*:**

- 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 Outcome*:**

- Able to write 8086 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. **L** **C**
3 **2**

(13A04606) DIGITAL SIGNAL PROCESSING LAB

Course Objective:

- *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 Outcome:

- *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. **L** **C**
3 **2**

(13A04607) DIGITAL COMMUNICATION SYSTEMS LAB

Course Objective:

- *To provide a real time experience for different digital modulation and demodulation schemes*

Learning Outcome:

- *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*

Minimum of Ten experiments to be conducted (Five from each Part-A&B)
HARDWARE EXPERIMENTS (PART – A)

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse code modulation.
4. Differential pulse code modulation.
5. Delta modulation.
6. Frequency shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

SOFTWARE EXPERIMENTS (PART-B)
Modeling of Digital Communications using MATLAB

1. Sampling Theorem – verification.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

Equipment required for Laboratories:

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.3 of part – A)
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 boxes.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. III - II Sem.

(13A52502) ADVANCED ENGLISH LANGUAGE COMMUNICATION 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.

1. ***K-VAN SOLUTIONS-Advanced communication lab***
2. ***DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.***
3. ***TOEFL & GRE****(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)*
4. ***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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A52601) MANAGEMENT SCIENCE

Course Objective:

The objective of this course is 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.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04701) VLSI DESIGN

Course Objective:

- *To understand VLSI circuit design processes.*
- *To understand basic circuit concepts and designing Arithematic Building Blocks.*
- *To have an overview of Low power VLSI.*

Learning Outcome:

- *Will be able to do VLSI circuit design.*
- *Will be able to do basic circuit concepts and designing Arithematic Building Blocks.*

UNIT I

Introduction: Brief Introduction to IC technology – MOS, PMOS, NMOS, CMOS & BiCMOS technologies – Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors.

Basic Electrical Properties of MOS and BiCMOS Circuits: $\mathbf{I_{ds} - V_{ds}}$ relationships, MOS transistor threshold Voltage, $\mathbf{g_m}$, $\mathbf{g_{ds}}$, figure of merit $\boldsymbol{\omega_0}$; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT II

Basic Circuit Concepts: Sheet Resistance R_s and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and 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-modeling and simulation, test generation, design for testability, Built-in-self-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*

Reference Books:

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", Thomson Learning.*
4. *John P. Uyemura, "Introduction to VLSI Circuits and Systems", John wiley, 2003.*
5. *John M. Rabaey, "Digital Integrated Circuits", PHI, EEE, 1997.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04702) OPTICAL FIBRE COMMUNICATION

Course Objective:

- *To learn the basic concepts of fibre optics communications.*
- *To make the students learn the system with various components or process for various applications.*
- *To enlighten the student with latest trends in optical communications.*

Learning Outcome:

- *Graduate will demonstrate the ability to design a system, component or process as per needs and specification.*
- *Students can learn about SONET/SDH and its application.*

UNIT I

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

UNIT II

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

UNIT III

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensing schemes, Fibre –to- Fibre joints, Fibre 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.**Applications**: Telephony, Telemetry, video distribution, military applications, passive and active sensing.

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.*

Reference Books

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.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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

(13A04703) EMBEDDED SYSTEMS

Course Objective:

- *To understand the fundamental concepts of Embedded systems.*
- *To learn the kernel of RTOS, architecture of ARM processor.*
- *To know various embedded Tools.*

Learning Outcome:

- *Learns the fundamental concepts of Embedded systems.*
- *Learns the kernel of RTOS, architecture of ARM processor*
- *Becomes aware of various embedded Tools.*

UNIT I

Introduction to Embedded Systems: Embedded Systems, Processor embedded into a system, Embedded hardware units and devices in a system, Embedded software in a system, Examples of embedded systems, Embedded system-on-chip (Soc), Design process in embedded systems, Formalization of embedded systems, Classification of embedded systems, Skills required for an embedded system designer.

UNIT II

8051 Microcontroller: Architecture: Hardware and Features of 8051; Addressing modes of 8051, Instruction set of 8051, Assembly language programming of 8051, External memory interfacing with 8051, 8051 Parallel I/O Ports, 8051 Interrupts, Timer and Counter Programming.

UNIT III

Advanced Processors: ARM7 Processor:-Architecture, Features; SHARC Processor:-Architecture, Features.

Devices and Communication Buses for Devices and Network: I/O types and examples, serial communication devices, parallel port devices, wireless devices, Timer and Counting devices, Watchdog timer, Real time clock.

UNIT IV

Device Drivers and Interrupts Service Mechanism: Programmed I/O Busy-wait Approach without Interrupt service mechanism, ISR Concept, Interrupt Sources, Interrupt handling mechanism, Multiple Interrupts, DMA, Device driver programming.

Interprocess Communication and Synchronization of Process, Threads and Tasks: Multiple process in an application, Multiple threads in an application, Tasks, Task states, Task and Data, Clear cut distinction between functions, ISRS and tasks by their characteristics.

UNIT V

Real Time Operating Systems: OS Services, Process Management, Timer functions, Event functions, Memory management, Device file and I/O Management, Interrupt Routines in RTOS environment and Handling of Interrupt Source Calls, Real Time Operating Systems, Basic Design using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues.

Text Books:

1. *Raj Kamal, "Embedded Systems", Tata Mcgraw Hill(TMH) Second Edition.*
2. *Kenneth J.Ayala Penram, "The 8051 Microcontroller", International (PI) Second Edition*

Reference Books:

1. *Frank Vahid, Tony D. Givargis, "Embedded System Design – A Unified Hardware/Software Introduction", John Wiley, 2002.*

2.*KVKK Prasad, "Embedded / Real Time Systems" Dreamtech Press, 2005****.***

3. Jonathan W. Valvano, Brooks / Cole, "Embedded Microcomputer Systems", Thompson Learning.

4. David E. Simon, "An Embedded Software Primer", Pearson Ed., 2005.

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B.Tech. IV - I Sem.	**Th**	**Tu**	**C**
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(13A04704) DIGITAL IMAGE PROCESSING
Elective-II

Course Objective:

- *To learn the fundamentals of Image Processing.*
- *To learn sampling and reconstruction procedures.*
- *To learn the various transforms used in image Processing.*
- *To study various concepts of image enhancement, reconstruction and image compression.*
- *To design image processing systems.*

Learning Outcome:

- *Develops ability to identify, formulate &solve problems involving images.*
- *Develops ability to design &conduct experiments, analyze &interpret image data.*
- *To design a software, Component or process as per needs &specifications.*
- *It will demonstrate the skills to use modern engineering tools, software's &equipment to analyze problems.*
- *Develop confidence for self-education&ability for life-long learning.*
- *It will show the ability to participate &try to succeed in competitive Exams.*

UNIT I

Digital Image fundamentals: Digital Image representation – Digital image processing System – Visual Perception- Sampling and Quantization - Basic relationships between pixels, and imaging geometry.

UNIT II

Image Transforms: Discrete Fourier Transform – Properties of 2 – D Fourier Transform – Fast Fourier Transform, Walsh, Hadamard, Discrete cosine transforms.

UNIT III

Image Enhancement: Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement in frequency Domain, Image smoothing, Image sharpening, Colour images

UNIT IV

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

UNIT V

Image Coding and Segmentation : Fidelity criteria, Encoding process, transform encoding, Detection and discontinuities, Edge linking and Boundary detection, Boundary description.

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.*

Reference Books:

1. *Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.*
2. *S jayaraman, S Esakkirajan, T Veerakumar, "Digital Image processing",Tata McGraw Hill*
3. *William K. Pratt, "Digital Image Processing", John Wilely, 3rd Edition, 2004.*

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(13A04705) RADAR ENGINEERING AND NAVIGATIONAL AIDS
(Elective-II)

Course Objective:

- *This course describes the understanding of the components of a radar system and their relationship to overall system performance*
- *To become familiar with design, operation, and applications of various types of radar systems*
- *To understand clutter and its effects of radar system performance and learn the principle of target track and various types of radar antennas.*

Learning Outcome:

- *To become familiar with fundamentals of radar.*
- *To gain in knowledge about the different types of radar and their operation.*
- *Need for signal detection in radar and various radar signal detection techniques.*
- *Will demonstrate the ability to design a system component or process as per needs & specifications.*
- *Will demonstrate the ability to identify, formulate & solve engineering problems.*
- *Will show the ability to participate and try to succeed in competitive examination*

UNIT I

Nature of Radar and Radar equation – Simple form of Radar equation – Radar block diagram and operation, Radar frequencies, Applications of Radar.

Minimum Detectable signal – Receiver noise, Probability – Density functions, signal – to – noise ratio, Radar cross section of targets, cross-section fluctuations system losses.

UNIT II

Radar components : RF amplifier, TWT, CFA, Modulators, mixers – Conversion loss, Noise figure, Balanced mixer, Image recovery mixer, Duplexers – Branch type, Balanced type and solid state duplexers, limiters, Displays – CRT displays, A,B,C,D – scopes PPI and RHI.

UNIT III

Radar systems: CW radar, frequency-modulates CW radar, multiple - Frequency CW radar. MTI radar – Delay line cancellers, Pulse repetition frequencies, Range-gated Doppler filters tracking radar – Range and angle tracking sequential lobing and conical scanning.

UNIT IV

Radio direction finding and radio ranges, the loop antenna, the goniometer, errors in direction finding the LF/MF four-course radio range, VHF-VOR, VOR receiving equipment.

UNIT V

Hyperbolic systems of navigation & DME: TACAN: Loran-A, Loran-C, The decca navigation system, decca receivers.

DMA-operation, TACAN STACAN equipment.

Text Books:

1. *M.I.Skolnik, "Introduction to radar systems", 2nd edition, TMH 1980.*
2. *N.S.Nagaraja, "Elements on electronic navigation", 2nd edition, TMH 1996.*

Reference Books:

1. *1.G.M.Miller, "Modern electronic communication", Prentice Hall, 6th Edition, 1999.*
2. *Kennedy & Davis, "Electronic communication systems", Mc Graw Hill, 4th Edition, 1993*.

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(13A04706) TELEVISION ENGINEERING
(Elective-II)

Course Objective:

- *To understand working principles of Monochrome and color television*
- *To gain sufficient knowledge regarding different modules present in the TV transmitter and receiver and their design considerations*
- *To get adequate knowledge regarding functioning of modern televisions system such as DTH*

Learning Outcome:

After completion of this course the student will be able to

- *Get complete knowledge regarding the working principles involved in both Monochrome and Color Television*
- *Get Adequate knowledge regarding different modules present in the TV transmitter and receiver and their design considerations*
- *Get familiarized with principles involved in the of functioning of modern televisions system such as DTH*

UNIT I

Fundamentals of Telivision :Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes-composite video signal-video signal dimension- horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth.

UNIT II

Monochrome Television Transmitter and Receiver : TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner-Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform – Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits – EHT generation – Receiver Antennas.

UNIT III

Essentials of Colour Television : Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals-colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes-purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission-bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.

UNIT IV

Colour Television systems:NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL –D colour system- PAL coder – Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals- colour burst separation – Burst phase Discriminator – ACC amplifier- Reference Oscillator- Ident and colour killer

circuits- U and V demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.

UNIT V

Advanced Television Systems : Satellite TV technology- Cable TV – VCR- Video Disc recording and playback- Tele Text broadcast receiver – digital television – Transmission and reception- projection Television – Flat panel display TV receiver – Sterio sound in TV – 3D TV – EDTV – Digital equipments for TV studios.

Text Books:

1. *R.R.Gulati, " Monochrome Television Practice, Principles, Technology and servicing , New age International Publishes, Second edition, 2004.*
2. *R.R.Gulati "Monochrome and colour television ", New age Internationl Publisher, 2003.*

Reference Books:

1. *A.M Dhake, "Television and Video Engineering", TMH, Second edition, 2003.*
2. *S.P.Bali, " Color Television, Theory and Practice", TMH, 1994.*

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(13A04707) VLSI & EMBEDDED SYSTEMS LABORATORY

Note: The students are required to perform any **Five** Experiments from each Part of the following.

Part-A: VLSI Lab

Course Objective:

- *To design and draw the internal structure of the various digital integrated circuits*
- *To develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.*
- *To verify the logical operations of the digital IC's (Hardware) in the laboratory.*

Learning Outcome:

After completion of the course the students will be able to

- *Design and draw the internal structure of the various digital integrated circuits*
- *Develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.*
- *Verify the logical operations of the digital IC's (Hardware) in the laboratory*

List of Experiments:

1. Realization of Logic Gates.
2. 3 to 8 Decoder- 74138.
3. 8 x 1 Multiplexer-74151 and 2 x 4 De-multiplexer-74155.
4. 4-Bit Comparator-7485.
5. D Flip-Flop-7474.
6. Decade counter-7490.
7. Shift registers-7495.
8. ALU Design.

Equipment Required:

1. Xilinx ISE Software.
2. Digital IC's.
3. Personal Computers.
4. Necessary Hardware Kits.

Part-B: Embedded Systems Lab

Course Objective:

- To develop an algorithm, the flow diagram, source code in Embedded C and, perform the compilation
- To generate the required binary file which can be dumped into the controller and obtain the respective output control on the connected peripheral.
- To verify the logic with the necessary hardware.

Learning Outcome:

After completion of the course the students will be able to

- *Develop an algorithm, the flow diagram, source code in Embedded C and, perform the compilation.*
- *Generate the required binary file which can be dumped into the controller and obtain the respective output control on the connected peripheral.*
- *Verify the logic with the necessary hardware.*

List of Experiments:

1) To develop program for basic mathematical operations.
2) To develop a program for block operations.
3) To develop a program to generate square wave over port pins.
4) To develop a program to read keyboard and code.
5) To develop a program to drive Elevator.
6) To develop a program for temperature indicator using ADC.
7) Asynchronous serial communication.
8) DC-Motor control.

Equipment Required:

1) KEIL µ-vision 3 software.
2) Personal computers.
3) Necessary Hardware Kits (8051 Developer kit/ PIC µ-controller developers kit).
4) Necessary Interfacing boards.

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(13A04708) MICROWAVE & OPTICAL COMMUNICATIONS LAB

Course Objective:

- *To verify the characteristics of various microwave components using microwave test bench.*
- *Initiate an expose the newcomers to exciting area of optical communication*

Learning Outcome:

- *Students acquire applications and testing of microwave components.*
- *Students acquire knowledge on the various applications of optical fiber communications*
- *Students develop confidence for self education and ability for life -long learning.*

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. Scattering parameters of Directional Coupler.
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 Ammetersn	10 nos.
4. Multi meters	10 nos.
5. CROs	8 nos.
6. GUNN Power Supply, Pin Moderator	4 nos.
7. Reflex Klystron with mount	10 nos.
8. Crystal Diodes	50 nos.
9. Micro wave components (Attenuation)	10 nos.
10. Frequency Meter (Direct frequency)	10 nos.
11. Slotted line with carriage	10 nos.
12. Probe detector	10 nos.
13. wave guide shorts	6 nos.
14. Pyramidal/conical Horn Antennas	4 nos.
15. Rectangular to circular transition	2 nos.

16. Directional Couplers with different (coupling factors) 5 nos.
17. E, H, Magic Tees 2 nos. each.
18. Circulators, Isolator 10 nos.
19. Matched Loads 30 nos.
20. Antenna Training System with Tripod and Accessories 1no.

21. Fiber Optic Analog Trainer based LED 3 nos.
22. Fiber Optic Analog Trainer based laser 2nos.
23. Fiber Optic Digital Trainer 1 no.
24. Fiber cables - (Plastic, Glass)

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(13A04801) MOBILE COMMUNICATION

***Course Objective**:*

- *To learn about the evolution process analog cellular system and its working operation.*
- *To enable the student to study the mobile radio channels and their effects.*
- *To understand various digital modulation techniques used in cellular systems.*
- *To enable the student to acquire the knowledge about various diversity and other schemes to improve the signal quality at the receiver.*

Learning Outcome:

This course provides the students to learn fundamental concepts of cellular concepts in mobile communications. At the end of the semester, they should be able to:

- *Know the types of mobile channels & their effects on the reception of signal strength.*
- *Analyze the received signal characteristics.*
- *Understand various digital modulation schemes used in cellular communications.*
- *Design suitable receiver systems to Counter balance the effects of the mobile channel on the received signal.*

UNIT I

Mobile Radio & its Signal Environment: Introduction, Cellular network planning, The mobile radio communication medium, Propagation path loss, Multipath fading due to scattering factors, Delay spread, Coherence bandwidth, Multipath fading phenomenon, Review of statistical communication theory – Probability density functions & Level crossing rate.

UNIT II

Path loss over Flat & Hilly Terrains: Path loss prediction based on model analysis, Diffraction loss, Diffraction loss over rounded hills, Path clearance criteria, Lee's Macro-cell & Microcell models, Inbuilding prediction models, Signal threshold prediction, Signal coverage area prediction, Wideband signal propagation.

UNIT III

Received Signal Characteristics: Short term versus long term fading, Model analysis of short term fading, Cumulative probability distribution (CPD) , Level crossing rate, Calculating the average duration of fades, Random variables related to mobile radio signals, Phase correlation characteristics, Simulation models.

UNIT IV

Modulation Technology: Digital modulation for non-fading and fading cases, Constant envelope modulation – QPSK, OQPSK, $\pi/4$ - DQPSK, GMSK, OFDM modem, brief introduction to spread spectrum systems – Direct sequence, Frequency hopped modulation schemes.

UNIT V

Diversity Schemes & Interference Problems: Diversity schemes – Space diversity, Polarization diversity, Frequency diversity, & Time diversity (qualitative treatment only), Effects of interference, Co-channel interference, Adjacent channel interference, Hand off – different types of hand off mechanisms, Near-end, to Far-end ratio interference, inter-modulation interference, Inter-symbol interference.

***Text Books**:*

1. *William C. Y. Lee, "Mobile Communication Engineering – Theory and Applicatons," McGraw Hill Education Private Limited, Second Edition – 2008.*
2. *Gordon L. Stuber, "Principles of Mobile Communication," Kluwer Acadeimic Publishers, Second Edition – 2001.*

Reference Books:

1. *William C. Y. Lee, "Mobile Cellular Telecommunications – Analog and Digital Systems," McGraw Hill, Second Edition – 2006.*
2. *G. Sasibhushana Rao, "Mobile Cellular Communication," Pearson, 2013.*

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(13A04802) COMPUTER NETWORKS

Course Objective:

- *An understanding of the overriding principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.*
- *An understanding of computer networking theory, including principles embodied in the protocols designed for the application layer, transport layer, network layer, and link layer of a networking stack.*
- *An understanding of specific implemented protocols covering the application layer, transport layer, network layer, and link layer of the Internet (TCP/IP) stack.*
- *An understanding of security issues.*

Learning Outcome:

- *Students will learn to list and classify network services, protocols and architectures, explain why they are layered.*
- *Student will learn to explain key Internet applications and their protocols.*
- *Students will learn to explain security issues in computer networks.*
- *To master the terminology and concepts of the OSI reference model and the TCP- IP reference model.*
- *To master the concepts of protocols, network interfaces, and Design/performance issues in local area networks and wide area networks.*
- *To be familiar with wireless networking concepts.*
- *To be familiar with contemporary issues in networking technologies.*
- *To be familiar with network tools and network programming.*

UNIT I

Theoretical basis for communication, Maximum data rate of channel, communications media, Network goals, Application of networks, protocol hierarchies, OSI reference model, Design issues for the layers in the model, Modulation and keying alternatives, multiplexing, modems, parallel and serial data transmission, handshake procedures, RS 232C, V.14/V.28, RS 449 interfaces, X.21, IEEE protocols, Link switching techniques.

UNIT II

Local Area Networks: Local communication alternatives, static and dynamic channel allocation in LANs, the ALOHA protocols, LAN protocols, IEEE logical link control, Ethernet, Token bus and Token ring protocols.

Data link layer: Design issues, Error detection and correction, sliding window protocols, Wide area network standards, SDLC, HDLC, X.25 protocols**.**

UNIT III

Network layer Design issues, Routing algorithms, congestion control algorithms, Internetworking, Transport layer design issues, connection management, Transport protocol X.25, session layer design issues, Remote procedure cell.

UNIT IV

Presentation layer, Abstract syntax notation, Data compression techniques, Cryptography, Application such as file transfer, Electronic mail and virtual terminals, X.400 protocol for electrical messaging, overview of ARPANET, MAP, TOP, Novell Netware, PC/NOS, unix support for networking.

UNIT V

World wide web, web browsers, web servers, uniform resource locator, Home pages, Basics of HTML, creating links, Anatomy of URL and kinds of URLs, HTML assignments, Editors and converters, New features of HTML, creating tables, Using images, Using external media, writing and designing web pages, Introduction to CGI scripts.

Text Books:

1. *Andrew S Tenenbaum, "Computer Networks", PHI, 3rd edition, 1997.*
2. *Laura Lemay, web publishing with HTML 3.0, PHI, 2nd edition, 1996.*

Reference Books:

1. *Michael A. Gallo, William M. Hancock, "Computer Communications and Networking Technologies", Cengage Learning.*
2. *Natalia Olifer, Victor Olifer, "Computer Networks-Principles, Technologies and Protocols for Network Design", Wiley India.*
3. *Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition.*
4. *Nader F. Mir, "Computer and Communication Networks", Pearson Education.*

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(13A04803) SATELLITE COMMUNICATION
(Elective-III)

Course Objective:

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

Learning Outcome:

- *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 TO SATELLITE COMMUNICATIONS:
Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.
Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT II
SATELLITE SUBSYSTEMS AND LINK DESIGN:
Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.
Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

UNIT III
EARTH STATION TECHNOLOGY, LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS:
Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.
Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs.

UNIT IV
MULTIPLE ACCESS:
Frequency division multiple access (FDMA) Intermodulation, 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 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. *Timothi Pratt, Charles Bostian and Jeremy Allnutt, "Satellite communications", WSE, Wiley publications, 2nd Edition, 2003.*
2. *Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, "Satellite communications Engineering", Pearson Publications, 2nd Edition, 2003.*

Reference Books:

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

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(13A04804) SPREAD SPECTRUM COMMUNICATION
(Elective-III)

***Course Objective**:*

- *To understand the general concepts of spread spectrum*
- *To generate spread spectrum signals.*
- *To study various applications of spread spectrum.*
- *To learn the working operation of CDMA systems.*

***Learning Outcome**:*
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 quadri-phase modulations, Pseudo noise (PN) signal characteristics, Direct Sequence receiver, Frequency Hopping – 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, Partial correlation of PN signals, Generation of PN signal, Despreading the PN signal, Interference rejection, Output Signal – to – Noise ratio, Antijam characteristics, Interception, Energy and Bandwidth efficiency. 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 – sequence receivers, Other methods of carrier tracking, Delay lock loop analysis, Tau-Dither loop, Coherent carrier 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 with acquisition 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 bandwidth efficiency in multiple access, Selective calling and identification, Antijam considerations, Jamming direct-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 their technical 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.*

Reference Books:

1. *Dr. Kamilo Feher, "Wireless Digital Communications – Modulation & Spread Spectrum Applications", PHI, 1999.*
2. *T. S. Rappaport, "Wireless Communications – Principles and Practice," PHI, 2001.*
3. *Upena Dalal, "Wireless Communication", Oxford Higher Educatiion, 2009.*
4. *Andrea Goldsmith "Wireles Communications", Cambridge University Press, 2005.*

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(13A04805) MULTIMEDIA COMMUNICATION
(Elective-III)

Course objective:

- *This course is to provide students with a background in the engineering aspects of multimedia communications. The course is expected to cover the following topics: representation of multimedia information, Information compression , multimedia storage, internet applications, and multimedia communication over networks.*

Learning Outcome:

- *After completion students will have sufficient knowledge in communication, Data management, Multi media design, web applications. Having at least some basic skills and knowledge in these areas is considered part of the general skills, the so -called "transversal competencies" which are very important regardless of specialization*

UNIT I

MULTIMEDIA COMMUNICATIONS: Introduction, multimedia networks, multimedia applications.

Multimedia information representation: Introduction, digitization principles, representation of text, images, audio & video.

UNIT II

TEXT & IMAGE COMPRESSION: Various compression principles.

TEXT COMPRESSION: Static Huffmann coding, dynamic Huffman coding, arithmetic coding, Lempel-ziv coding

IMAGE COMPRESSION: Graphics Interchange format, tagged image file format, digitized document, digitized pictures, JPEG (Introduction)

UNIT III

AUDIO & VIDEO COMPRESSION: Audio compression: Differential PCM, Adaptive differential PCM, Code excited LPC, MPEG audio coders, Dolby audio coders.

VIDEO COMPRESSION: Basic principles, Video compression standard H.26 J, h.263, MPEG (Basic introduction)

UNIT IV

INTERNET APPLICATIONS: Domain name system, name structure and administration, DNS resource records, Electronic mail message structure, content transfer, Basic concept of internet telephony, World Wide Web

UNIT V

MULTIMEDIA NETWORKING: Applications-streamed stored and audio-making the best Effort service-protocols for real time interactive Applications-distributing multimedia-beyond best effort service-secluding and policing Mechanisms-integrated services-differentiated Services-RSVP

Text Books:

I. Fred Hulsall, "Multimedia communications", Pearson Education Asia.

2. K. Thakkar, "Multimedia SystemsDesign", PHI

Reference Books:

1, Ralf Stein Metz & Klara Nahrstedt, "Multimedia: Computing, Communications & Applications", Pearson Education.

2. Steve Rimmer, "Advanced Multimedia Programming",MB!

3. Tay Vaughan, "Multimedia: Making it Work", TMH, 3rd edition.

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

(13A04806) BIO-MEDICAL INSTRUMENTATION
(Elective-IV)

Course Objective:

- *To understand the functioning of Human Cell and its electrical characteristics.*
- *To get Sufficient knowledge about Cardiovascular measurement and circulatory System of heart*
- *To get familiarize with pace makers and Defibrillators*
- *To understand about the electrical hazards that may occur during the usage of medical instruments*

Learning Outcome:

After completion of this course the student will be able to

- *Understand the functioning of Human Cell and its electrical characteristics*
- *Acquire sufficient knowledge about Cardiovascular measurement and circulatory System of heart*
- *Get familiarize with pace makers and Defibrillators*
- *Understand about the electrical hazards that may occur during the usage of medical instruments*

UNIT I

Human cell and its Electrical characteristics neuron and impulses, Recording Electrodes – Electrode-Electrolyte interface, polarizable – Non-polarizable Electrodes, body surface recording Electrodes, internal Electrodes, Micro Electrodes, Electrode array & Practical hints in using Electrodes.

UNIT II

Bioelectric potential and cardiovascular measurement circulatory system of heart – ECG Anatomy & Function of heart abnormal cardiac Rhythms – Arrhythmias – Einthoven triangle.
EEG recording system (10-20 electrode System) Biorhythms – Sleep pattern

UNIT III

Therapeutic and prosthetic devices, Cardiac pace maker, Types – Asynchronous and Synchronous modes of operation (Demand). Asynchronous pace maker – Working principle and Function demand PM – Working principle – QRS triggered and atrioventricular Synchronized PM lead wires and Electrodes, Cardioverter.
Defibrillator : Working principle of DC Defibrillation Electrodes used. Infant incubator and Lithotripry.

UNIT IV

Electrical Hazards in medical instruments macro and micro shock – devices to protect against electrical hazards – Ground fault interrupter, isolation transformer, line isolation monitor, receptacle tester, electrical safety analyzer equipment, preventive maintenance.

UNIT V

Image Systems: Introduction, Basic principle and block diagram of x-ray machine, x-ray computed topography (C.T. Scanner) and Nuclear Magnetic resonance (NMR) Short-wave Diathermy, Microwave Diathermy, Ultrasound Therapy unit.
Recent trends : Ultrasonography -Introduction, medical ultrasound, block diagram of pulse echo-system, A-Scan, M-mode, B-scanner and real time ultrasound imaging systems – lasers principle and

operation of laser types of lasers – Pulsed Ruby laser – ND-YAG laser – Helium –Neon laser-Argon laser-C02 laser exciner laser, Semiconductor lasers – Laser safety.

Text Books:

1. *John G.Webser, "Medical Instrumentation Applications and Design" John Wiley & Sons (1998).*
2. *Seslie Cromwell, Fred J.Weibell and Esich A.Plefittes, "BioMedical Instrumentation & measurements", Pearson Education, 9th edition.*

Reference Books:

1. *RS Khandpur, "Handbook of BioMedical Instrumentation", Tata Mc Graw Hill.*
2. *Walter Welko- Witiz and Sid Doutsch, "Biomedical Instruments: Theory and Design"*

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

(13A04807) SPEECH PROCESSING
(Elective-IV)

Course Objective:

- *To understand how speech signals are processed for Analysis and Synthesis. Also to understand speech processing in the context of its creation (anatomy, classification of sounds, etc.) as well as in its perception (psychology & neuroscience).*
- *To analyze tools that are needed for analysis and synthesis, in the areas of digital signal processing for time-frequency analysis.*

Learning Outcome:

- *After completing the course, the student will be familiar with the principles and the techniques*

  used in speech processing. This includes speech synthesis, speech coding and speech recognition.

UNIT I

FUNDAMENTALS OF DIGITAL SPEECH PROCESSING: Anatomy & Physiology of Speech organs, the process of speech production, the acoustic theory of speech production, Digital models for speech signals.

TIME DOMAIN MODELS FOR SPEECH PROCESSING: Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate ,Speech vs silence discrimination using Average energy and zero crossing, Pitch period estimation using parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT II

LINEAR PREDICTIVE CODING (LPC) ANALYSIS: Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition, Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT III

HOMOMORPHIC SPEECH PROCESSING: Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, the Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

SPEECH ENHANCEMENT: Nature of interfering sounds, Speech enhancement techniques, Spectral subtraction, Enhancement by re-synthesis.

UNIT IV

AUTOMATIC SPEECH RECOGNITION: Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System

SPEAKER RECOGNITION: Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

UNIT V

HIDDEN MARKOV MODEL (HMM) FOR SPEECH: Hidden markov model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS, Adapting to variability in speech, Language models.

Text Books:

1. *L.R Rabiner and S.W.Schafer, "Digital processing of speech signals", Pearson.*
2. *Douglas O Shaughnessy, "Speech communication", Second Edition Oxford University press, 2000.*
3. *L.R Rabinar and B.H.Juang, "Fundamentals of Speech Recognition"*

Reference Books:

1. *Thomas F. Quateri, "Discrete Time Speech Signal Processing", 1/e, Pearson*
2. *Ben Gold & Nelson Morgan, "Speech & Audio Signal Processing", 1/e, Wiley*

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

(13A04808) DSP PROCESSORS & ARCHITECTURES

(Elective-IV)

Course Objective:

- *To understand the concept of DSP Architecture & comparison of this with that of microprocessors.*
- *To understand addressing modes, instruction sets , pipelining and application programs in TMS320C54XX processor*
- *To understandthe architectural issues of programmable DSP devices and their relationship to the algorithmic requirements, architectures of commercially popular programmable devices and the use of such devices for software development and system design*
- *To highlight the suitability of programmable DSP devices for various application areas and motivate to design systems around these devices.*

Learning Outcome:

- *To become familiar with fundamentals of DSP Processors & architectures.*
- *To gain in knowledge about the different types of processors and their operation.*
- *Will demonstrate the ability to design a system component or process as per needs & specifications.*
- *Will demonstrate the ability to identify, formulate & solve engineering problems.*

UNIT I

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT II

Architectures for Programmable DSP Devices : Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Execution Control and Pipelining : Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT III

Programmable Digital Signal Processors : Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On- Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT IV

Implementations of Basic DSP Algorithms : The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation of FFT Algorithms : An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT V

Interfacing Memory And I/O Peripherals to Programmable DSP Devices : Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

Text Books:

1. *Avtar Singh and S. Srinivasan, "Digital Signal Processing", Thomson Publications, 2004.*
2. *Lapsley et al. S. Chand & Co, "DSP Processor Fundamentals, Architectures & Features", 2000.*

Reference Books:

1. *B. Venkata Ramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", TMH, 2004.*
2. *Jonatham Stein, "Digital Signal Processing", John Wiley, 2005.*