

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

Course Structure for B.Tech-R15 Regulations

ELECTRONICS & INSTRUMENTATION ENGINEERING

I B.Tech. - I Semester

S.No	Course code	Subject	L	T	P	C
1.	15A52101	Functional English	3	1	-	3
2.	15A54101	Mathematics – I	3	1	-	3
3.	15A05101	Computer Programming	3	1	-	3
4.	15A51101	Engineering Chemistry	3	1	-	3
5.	15A01101	Environmental Studies	3	1	-	3
6.	15A52102	English Language Communication Skills Lab	-	-	4	2
7.	15A51102	Engineering Chemistry Lab	-	-	4	2
8.	15A05102	Computer Programming Lab	-	-	4	2
Total			15	5	12	21

I-II Semester

S.No	Course code	Subject	L	T	P	Drg	C
1.	15A52201	English for Professional Communication	3	1	-	-	3
2.	15A54201	Mathematics – II	3	1	-	-	3
3.	15A04201	Network Analysis	3	1	-	-	3
4.	15A56101	Engineering Physics	3	1	-	-	3
5.	15A03101	Engineering Drawing	-	-	-	6	3
6.	15A04202	Network Analysis Lab	-	-	4	-	2
7.	15A56102	Engineering Physics Lab	-	-	4	-	2
8.	15A99201	Engineering and IT Workshop	-	-	4	-	2
Total			12	4	12	6	21

- * L - Lecture hours
- * T - Tutorial hours
- * P - Practical hours
- * Drg - Drawing
- * C - Credits

II B. Tech – I Sem

S. No	Course Code	Subject	L	T	P	C
1	15A54301	Mathematics-III	3	1	-	3
2	15A04301	Electronic Devices and Circuits	3	1	-	3
3	15A04302	Switching Theory and Logic Design	3	1	-	3
4	15A04303	Signals and Systems	3	1	-	3
5	15A02306	Electrical Technology	3	1	-	3
6	15A10301	Sensors and Transducers	3	1	-	3
7	15A04305	Electronic Devices and Circuits Lab	-	-	4	2
8	15A02307	Electrical Technology Lab	-	-	4	2
Total			18	06	08	22

II B. Tech – II Sem

S. No	Course Code	Subject	L	T	P	C
1	15A54402	Mathematics –IV	3	1	-	3
2	15A04401	Electronic Circuit Analysis	3	1	-	3
3	15A04410	Principles of Communication	3	1	-	3
4	15A04411	Pulse and Digital Circuits	3	1	-	3
5	15A02303	Control Systems Engineering	3	1	-	3
6	15A01408	Fluid Mechanics and Hydraulic Machinery	3	1	-	3
7	15A04404	Electronic Circuit Analysis Laboratory	-	-	4	2
8	15A10401	Instrumentation Laboratory	-	-	4	2
9	15A10402	Comprehensive Online Examination-I	-	-	-	1
Total			18	06	08	23

B.Tech III-I Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A52301	Managerial Economics and Financial Analysis	3	1	-	3
2.	15A04503	Linear Integrated Circuits and Applications	3	1	-	3
3.	15A10501	Digital IC Applications	3	1	-	3
4.	15A10502	Virtual Instrumentation	3	1	-	3
5.	15A10503	Electronic Measurements and Instrumentation	3	1	-	3
6.	15A05402 15A12401	MOOCS-I a. Computer Organization b. Operating Systems	3	1	-	3
7.	15A10504	Linear and Digital IC Applications Laboratory	-	-	4	2
8.	15A10505	Virtual Instrumentation Laboratory	-	-	4	2
9.	15A99501	Audit course -Social Values & Ethics	2	0	2	0
Total			20	06	10	22

B.Tech III-II Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A10601	Analytical Instrumentation	3	1	-	3
2.	15A04601	Microprocessors and Microcontrollers	3	1	-	3
3.	15A10602	Process Control	3	1	-	3
4.	15A10603	Power Plant Instrumentation	3	1	-	3
5.	15A10604	Industrial Instrumentation	3	1	-	3
6.	15A04603 15A10605 15A10606 15A01608	CBCC-I a. Digital Signal Processing b. PC based Instrumentation c. Automotive Electronics d. Intellectual Property Rights	3	1	-	3
7.	15A10607	Process Control Laboratory	-	-	4	2
8.	15A10608	Analytical Instrumentation Laboratory	-	-	4	2
9.	15A52602	Advanced English Language Communication Skills (AELCS) Laboratory (Audit Course)	-	-	2	-
10.	15A10609	Comprehensive Online Examination-II	-	-	-	1
Total			18	06	12	23

B.Tech IV-I Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A52601	Management Science	3	1	-	3
2.	15A10701	PLC and SCADA	3	1	-	3
3.	15A04702	Embedded Systems	3	1	-	3
4.	15A10702	Biomedical Instrumentation	3	1	-	3
5.	15A04604 15A10703 15A10704	CBCC - II a. VLSI Design b. Opto Electronics and LASER Instrumentation c. Digital Control Systems	3	1	-	3
6.	15A10705 15A10706 15A10707	CBCC - III a. Industrial Safety and Management b. System Design using Microcontrollers c. Telemetry and Telecontrol	3	1	-	3
7.	15A10708	PLC Laboratory	-	-	4	2
8.	15A10709	Microprocessors and Embedded Systems Laboratory	-	-	4	2
Total			18	06	08	22

B.Tech IV-II Semester (EIE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A10801 15A10802	MOOCS-II a. Digital Image Processing b. MEMS and Its Applications	3	1	-	3
2.	15A10803 15A10804	MOOCS-III a. Mechatronics for Instrumentation b. JAVA Programming	3	1	-	3
3.	15A10805	Comprehensive Viva Voce	-	-	4	2
4.	15A10806	Technical Seminar	-	-	4	2
5.	15A10807	Project Work	-	-	24	12
Total			6	02	32	22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**B. Tech I - I Sem. (EIE)**

L	T	P	C
3	1	0	3

(15A52101) FUNCTIONAL ENGLISH**(Common to All Branches)****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, better pay, and advanced knowledge 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 pharmacy. The prescribed book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The 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 learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

Objectives:

- 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 and critical thinking skills.
- To enhance the study skills of the students with emphasis on LSRW skills.

UNIT –I

Topics: Paragraph writing, writing letters, role play, reading graphs, prepositions, designing posters, tenses, making recommendations.

Text: ENVIRONMENTAL CONSCIOUSNESS' from *MINDSCAPES*
Climate Change - Green Cover – Pollution

UNIT –II

Topics: Compound nouns, imperatives, writing instructions, interpreting charts and pictures, note making, role play, prefixes, subject-verb agreement.

Text: EMERGING TECHNOLOGIES from *MINDSCAPES*
Solar Thermal Power - Cloud Computing - Nanotechnology

UNIT –III

Topics: Making conversations, homonyms and homophones, SMS and use of emotions, past participle for irregular verbs, group discussion, E - mail communication, antonyms, Preparing projects

Text: GLOBAL ISSUES from *MINDSCAPES*
Child Labour - Food Crisis - Genetic Modification - E-Waste - Assistive Technology

UNIT –IV

Topics: Group discussion, affixes, double consonants, debates, writing a book / film review, predicting and problem-solving-future tense, adverbs

Text: SPACE TREK from *MINDSCAPES*
Hubble Telescope - Chandrayan-2 - Anusat - Living Quarters - Space Tourism

UNIT –V

Topics: Compare and contrast, effective writing, group discussion, writing reports, writing advertisements, tweeting and blogging, types of interviews, framing questions.

Text: MEDIA MATTERS from *MINDSCAPES*

History of Media - Language and Media - Milestone in Media - Manipulation by Media - Entertainment Media - Interviews

Text Books:

1. MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.

References:

1. A Practical Course in Effective English Speaking Skills by J.K.Gangal, PHI Publishers, New Delhi.2012
2. Technical Communication, Meenakshi Raman, Oxford University Press,2011.
3. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4th edition.
4. Murphy's English Grammar with CD, Murphy, Cambridge University Press,3rd edition.
5. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO,2008.

Outcomes:

- Have improved communication in listening, speaking, reading and writing skills in general.
- Have developed their oral communication and fluency in group discussions and interviews.

- Have improved awareness of English in science and technology context.
- Have achieved familiarity with a variety of technical reports.

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B. Tech I - I Sem. (EIE)

L	T	P	C
3	1	0	3

(15A54101) MATHEMATICS – I

(Common to All Branches)

Objectives:

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations, Applications to first order equations; Orthogonal trajectories, Simple electric circuits.

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 , $e^{ax}V(x)$, $xV(x)$.

UNIT – II

Method of variation of parameters, linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – III

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.

UNIT – IV

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

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. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

References:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Outcomes:

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

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(15A05101) COMPUTER PROGRAMMING
(Common to All Branches)
Objectives:

- Understand problem solving techniques
- Understand representation of a solution to a problem
- Understand the syntax and semantics of C programming language
- Understand the significance of Control structures
- Learn the features of C language

UNIT - I

Overview of Computers and Programming - Electronic Computers Then and Now - Computer Hardware - Computer Software - Algorithm - Flowcharts - Software Development Method - Applying the Software Development Method.

Types, Operators and Expressions: Variable Names - Data Types and Sizes - Constants - Declarations - Arithmetic Operators - Relational and Logical Operators - Type Conversions - Increment and Decrement Operators - Bitwise Operators - Assignment Operators and Expressions - Conditional Expressions - Precedence and Order of Evaluation.

UNIT - II

Selections Statements – Iteration Statements – Jump Statements- Expression Statements - Block Statements.

Single Dimensional Arrays – Generating a Pointer to an Array – Passing Single Dimension Arrays to Functions – Strings – Two Dimensional Arrays – Indexing Pointers – Array Initialization – Variable Length Arrays

UNIT - III

Pointer Variables – Pointer Operators - Pointer Expressions – Pointers And Arrays – Multiple Indirection – Initializing Pointers – Pointers to Functions – C’s Dynamic Allocation Functions – Problems with Pointers.

Understanding the scope of Functions – Scope Rules – Type Qualifiers – Storage Class Specifiers- Functions Arguments –The Return Statement.

UNIT - IV

Command line arguments – Recursion – Function Prototypes – Declaring Variable Length Parameter Lists

Structures – Arrays of Structures – Passing Structures to Functions – Structure Pointers – Arrays and Structures within Structures – Unions – Bit Fields – Enumerations – typedef

UNIT - V

Reading and Writing Characters – Reading and Writing Strings – Formatted Console I/O – Printf - Scanf – Standard C Vs Unix File I/O – Streams and Files – File System Basics – Fread and Fwrite – Fseek and Random Access I/O – Fprintf () and Fscanf () – The Standard Streams – The Preprocessor Directives #define and #include.

Text Books:

1. “The Complete Reference C”- Fourth Edition- Herbert Schildt- McGrawHill Education.
2. “The C Programming Language” Second Edition- Brian W. Kernighan- Dennis M. Ritchie- Prentice Hall-India. (UNIT- I)

References:

1. Programming in C, Second Edition – Pradip Dey, Manas Ghosh, Oxford University Press.

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2. "C From Theory to Practice"- George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
 3. "Programming with C"- R S Bichkar- University Press.
 4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education. (UNIT-I)
 5. Computer Fundamentals and C Programming- Second Edition- P.Chenna Reddy- Available at Pothi.com (<http://pothi.com/pothi/book/dr-p-chenna-reddy-computer-fundamentals-and-c-programming>).

Outcomes:

- Apply problem solving techniques in designing the solutions for a wide-range of problems
- Choose appropriate control structure depending on the problem to be solved
- Modularize the problem and also solution

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(15A51101) ENGINEERING CHEMISTRY**(Common to ECE/EIE/ME/IT)****Objectives:**

- 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 the concepts of chemistry and apply to various materials for engineering applications.

UNIT – I WATER QUALITY AND 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

UNIT – II POLYMERS

i) Introduction: Basic concepts of polymerisation, Types of polymerisation (Chain Growth (Addition), Step growth (Condensation)), Mechanism: cationic, anionic, free radical and coordination covalent.

Plastomers: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications of PVC, Teflon, Bakelite and nylons.

Elastomers

Natural Rubber; Processing of natural rubbers, Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, Buna-N, Polyurethane, Polysulfide (Thiokol) rubbers

ii) Conducting polymers: Mechanism, synthesis and applications of polyacetylene, polyaniline.

iii) Inorganic Polymers: Basic Introduction, Silicones, Polyphosphazins $(-R)_2-P=N-$ applications

UNIT – III ELECTROCHEMISTRY

i) Galvanic cells, Nernst Equation, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries), Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen, Solid oxide)

ii) Corrosion: Introduction, type of corrosion (Concentration cell corrosion, Galvanic corrosion), Chemical (Dry) and Electrochemical (Wet) Theory of corrosion. Galvanic series, factors affecting the corrosion (Metal and environment). Prevention: Cathodic protection (Sacrificial anode and impressed current), Inhibitors (Anodic and cathodic),

electroplating (Copper, nickel and chromium) and electroless plating (Copper and nickel)

UNIT – IV FUELS AND COMBUSTION

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

Solid Fuels: Coal-Classification and Analysis (proximate and ultimate), Coke :Characteristics of metallurgical coke, Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline- Octane Number, Diesel -Cetane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

Gaseous Fuels: Natural gas, Producer gas, Water gas, Coal gas and Biogas. Determination calorific value of Gases fuels by Junker's calorimeter.

Combustion: Basic principles and numerical problems, Flue Gas analysis by Orsat's apparatus.

UNIT – V CHEMISTRY OF ENGINEERING MATERIALS

i) Cement: Composition, Classification, preparation (Dry and Wet processes), Setting and Hardening (Hydration and Hydrolysis)

ii) Refractories: Introduction, Classification , properties and applications

iii) Lubricants: Introduction, classification (Solid, liquid, semi solid, emulsion and synthetic), Theory of lubrication (Thin film, Thick film & Extreme pressure) , properties of lubricants and applications.

iv) Carbon clusters: Fullerenes and Carbon Nano Tubes (CNT)

Text Books:

1. Engineering Chemistry, First Edition, Jayaveera KN, Subba Reddy GV and Ramachandraiah C, McGraw Hill Higher Education, New Delhi, 2013.
2. A Text Book of Engineering Chemistry, 15th Edition, Jain and Jain, Dhanapathi Rai Publications, New Delhi, 2013.

References:

1. A Text book of Engineering Chemistry, 12th Edition, SS Dhara, Uma, S. Chand Publications, New Delhi, 2010.
2. Engineering Chemistry, First edition, K.B. Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Publications India Pvt Limited, 2010.
3. Engineering Chemistry, First edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013.

Outcomes: The student is expected to:

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

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(15A01101) ENVIRONMENTAL STUDIES
(Common to ECE/EIE/ME/IT)
Objectives:

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

succession – 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-spots 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 wastes – 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 Programmed. – 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, and birds – river, hill slopes, etc..

Text Books:

1. Text Book of Environmental Studies for Undergraduate Courses, Erach Bharucha, Universities Press Pvt Ltd, Hyderabad. 2nd Edition 2013.
2. Environmental Studies by Kaushik, New Age Publishers.

References:

1. Environmental Studies by Rajagopalan, Oxford Publishers.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

Outcomes:

- Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.

- Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
- Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
- By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.
- At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.

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(15A52102) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB**(Common to All Branches)**

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.

Objectives:

- To enable students 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

UNIT - 1

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels and consonants sounds
4. Phonetic Transcription

UNIT - II

5. Word Stress
6. Syllabification
7. Rules of word stress
8. Intonation

UNIT - III

9. Situational Dialogues
10. Role Plays
11. JAM
12. Describing people/objects/places

UNIT - IV

13. Debates
14. Group Discussions
15. Interview skills

UNIT - V

16. Video speech writing
17. Book reviews -oral and written

Minimum Requirements for ELCS Lab:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.
System Requirement (Hardware component):

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

- i) P – IV Processor
 - a) Speed – 2.8 GHZ
 - b) RAM – 512 MB Minimum
 - c) Hard Disk – 80 GB
- ii) Headphones of High quality

Suggested Software:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. Walden InfoTech Software.

References:

1. A Textbook of English Phonetics for Indian Students 2nd Ed T. Balasubramanian. (Macmillian),2012.
2. A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. A Hand book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011
5. Spring Board Succes, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderabad, 2010.

Outcomes:

- Become active participants in the learning process and acquire proficiency in spoken English.
- Speak with clarity and confidence thereby enhance employability skills.

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(15A51102) ENGINEERING CHEMISTRY LAB**(Common to ECE/EIE/ME/IT)****Objectives:**

- Will learn practical understanding of the redox reaction
- 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.

List of Experiments:

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. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
5. Determination of Alkalinity of Water
6. Determination of acidity of Water
7. Preparation of Phenol-Formaldehyde (Bakelite)
8. Determination of Viscosity of oils using Redwood Viscometer I
9. Determination of Viscosity of oils using Redwood Viscometer II
10. Determination of calorific value of gaseous fuels by Junker's Calorimeter

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11. Conductometric estimation of strong acid using standard sodium hydroxide solution
 12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
 13. Potentio metric determination of iron using standard potassium dichromate
 14. Colorometric estimation of manganese.
 15. pH meter calibration and measurement of pH of water and various other samples.

(Any 10 experiments from the above list)

References:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.

Outcomes:

- 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.

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B. Tech I - I Sem. (EIE)	L	T	P	C
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(15A05102) COMPUTER PROGRAMMING LAB
(Common to All branches)
Objectives:

- Learn C Programming language
- To make the student solve problems, implement algorithms using C language.

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

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$
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 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 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
 27. Write programs using recursion for finding Factorial of a number, GCD, LCM, and solving Towers of Hanoi problem.
 28. Write a program to exchange two numbers using pointers.
 29. 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.
 30. A file consists of information about employee salary with fields employeedid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeedid, 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.
 31. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.

32. Write a program to find the square root of a number without using built-in library function.
33. Write a program to convert from string to number.
34. Write a program to implement pseudo random generator.
35. Write a program to generate multiplication tables from 11 to 20.
36. 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.
37. 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.
38. Write a program to find the execution time of a program.
39. 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:

1. Instructors are advised to conduct the lab in LINUX/UNIX environment also
2. 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 Theory. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

References:

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

Outcomes:

- Apply problem solving techniques to find solutions to problems
- Able to use C language features effectively and implement solutions using C language.
- Improve logical skills.

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(15A52201) ENGLISH FOR PROFESSIONAL COMMUNICATION
1. INTRODUCTION:

English is a global language and has international appeal and application. It is widely used in a variety of contexts and for varied purposes. The students would find it useful both for social and professional development. There is every need to help the students acquire skills useful to them in their career as well as workplace. They need to write a variety of documents and letters now extending into professional domain that cuts across business and research also. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The 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 learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. OBJECTIVES:

1. To develop confidence in the students to use English in everyday situations.
2. To enable the students to read different discourses so that they appreciate English for science and technologies.
3. To improve familiarity with a variety of technical writings.
4. To enable the students to acquire structure and written expressions required for their profession.
5. To develop the listening skills of the students.

3. SYLLABUS:
UNIT –I

Topics: Group discussion, cause and effect, events and perspectives, debate, if conditional, essay writing.

Text: **LESSONS FROM THE PAST** from *MINDSCAPES*

Importance of History - Differing Perspectives - Modern Corporatism - Lessons From The Past

UNIT-II

Topics: Idioms, essay writing, power point presentation, modals, listening and rewriting, preparing summary, debate, group discussion, role play, writing a book review, conversation

Text: **'ENERGY'** from *MINDSCAPES*

Renewable and Non-Renewable Sources - Alternative Sources -Conservation -Nuclear Energy

UNIT-III

Topics: Vocabulary, impromptu speech, creative writing, direct and indirect speech, fixed expressions, developing creative writing skills, accents, presentation skills, making posters, report writing

Text: **'ENGINEERING ETHICS'** from *MINDSCAPES*

Challenger Disaster - Biotechnology - Genetic Engineering - Protection From Natural Calamities

UNIT-IV

Topics: Vocabulary, Conversation, Collocation, Group discussion, Note-making, Clauses, Interpreting charts and tables , Report writing.

Text: **'TRAVEL AND TOURISM'** from *MINDSCAPES*

Advantages and Disadvantages of Travel - Tourism - Atithi Devo Bhava - Tourism in India

UNIT-V

Topics: Vocabulary, phrasal verbs, writing a profile, connectives, discourse markers, problem-solving, telephone skills, application letters, curriculum vitae, interviews (telephone and personal)

Text: 'GETTING JOB-READY' from *MINDSCAPES*

SWOT Analysis - Companies And Ways Of Powering Growth - Preparing For Interviews

Prescribed Text

MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.

REFERENCES:

1. **Effective Tech Communication**, Rizvi, Tata McGraw-Hill Education, 2007.
2. **Technical Communication**, Meenakshi Raman, Oxford University Press.
3. **English Conversations Prcatice**, Grant Taylor, Tata Mc GrawHill publications,2013.
4. **Practical English Grammar**. Thomson and Martinet, OUP, 2010.

Expected Outcomes:

At the end of the course, students would be expected to:

1. Have acquired ability to participate effectively in group discussions.
2. Have developed ability in writing in various contexts.
3. Have acquired a proper level of competence for employability.

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(15A54201) MATHEMATICS – II
(Common to All Branches)

Objectives: Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution of partial differential equations.

UNIT – I

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 – II

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- Parseval's formula- Complex form of Fourier series.

UNIT – III

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

UNIT – IV

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.

UNIT – V

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

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
- 3.

REFERENCES:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes:The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

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(15A04201) NETWORK ANALYSIS
(Common to ECE & EIE)
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.

UNIT I

Circuit Analysis Techniques: Voltage and Current Laws, Basic Nodal and Mesh Analysis, Network Theorems- Linearity and Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Milliman's theorems. Source Transformation.

UNIT II

DC Transient Circuits : The Source free RL, RC & RLC Circuits. Natural & Forced Response of RL, RC & RLC Circuits. RC & RL Circuit responses to Pulse and Exponential signals.

Unit III

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. Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power, Power Factor, Complex Power.

UNIT IV

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, Bandwidth of parallel resonant circuits, General case of parallel resonance circuit.

Magnetically Coupled Circuits: Mutual Inductance, Energy Considerations, The Linear Transformer, The Ideal Transformer

Unit V

Two Port Networks & Filters: Relationship of two port variables, Short circuit Admittance parameters, Open circuit Impedance parameters, Transmission Parameters, Hybrid Parameters, Relationship between parameter sets, Parallel connection of two port networks.

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, band Pass Filters ,band reject filters - illustrated problems.

Text Books:

1. W H Hayt, J E Kemmerly and S M Durbin, "Engineering Circuit Analysis", Tata McGraw-Hill, 7th edition, 2010.
2. John D. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition, 2012.

Reference Books:

1. Van Valkenburg, "Network Analysis", PHI, 3rd Edition, 2011.
N C Jagan & C Lakshminarayana "Network Analysis" BS Publications 3rd Edn.2014

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(15A56101) ENGINEERING PHYSICS**(Common to All Branches)****Objectives:**

- 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 non-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 semiconductor based electronic devices , basic concepts and applications of semiconductors 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 emerging technologies are elicited.

UNIT - I**PHYSICAL OPTICS, LASERS AND FIBRE OPTICS**

Physical Optics: Interference (Review) – Interference in thin film by reflection –Newton's rings –Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

Fiber optics: Introduction - construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in Optical fibers –Block diagram of Optical fiber communication system – Applications of optical fibers

UNIT – II

CRYSTALLOGRAPHY AND ULTRASONICS

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravais lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method.

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

UNIT – III

QUANTUM MECHANICS AND ELECTRON THEORY

Quantum Mechanics: Matter waves – de'Broglie hypothesis and properties - Schrodinger's time dependent and independent wave equations – Physical significance of wave function - Particle in one dimensional infinite potential well.

Electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Source of electrical

resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT – IV

SEMICONDUCTORS AND MAGNETIC MATERIALS

Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Formation of p-n junction.

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 (Qualitative treatment) – Hysteresis - Soft and hard magnetic materials, applications of magnetic materials.

UNIT – V

SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

Superconductivity: Introduction - Effect of magnetic field - Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth - BCS theory (qualitative treatment) — Josephson effects –Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel –Applications of nanomaterials.

Text Books:

1. Engineering Physics – K.Thyagarajan, 5th Edition, MacGraw Hill Publishers, NewDelhi, 2014.
2. Physics for Engineers - N.K Verma, 1st Edition, PHI Learning Private Limited, New Delhi,2014.

References:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.
2. Engineering Physics – D K Pandey, S. Chaturvedi, 2nd Edition, Cengage Learning, New Delhi, 2013.
3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1nd Edition, Oxford University Press, New Delhi, 2015.

Outcomes:

- 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 the bases for the band theory are focused.
- 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.

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(15A03101) ENGINEERING DRAWING

Objectives:

- To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
- To learn about various projections, to understand complete dimensions and details of object.
- Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

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

Scales: Plain, Diagonal and Vernier;

Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: lines inclined to one or both planes, Problems on projections, Finding True lengths.

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes.

Developments of Solids: 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, 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

References:

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. Gupta, J.K. Publishers

Outcomes:

- Drawing 2D and 3D diagrams of various objects.
- Learning conventions of Drawing, which is an Universal Language of Engineers.
- Drafting projections of points, planes and solids.

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(15A04202) NETWORK ANALYSIS LAB**(Common to ECE & EIE)**

1. Verification of KCL & KVL for any network.
2. Verification of Superposition Theorem with analysis.
3. Verification of Thevenin's Theorem with analysis.
4. Verification of Maximum Power Transfer Theorem with analysis.
5. Analysis of RL & RC circuits for pulse excitation.
6. Frequency response of series resonance circuit with analysis and design.
7. Frequency response of parallel resonance circuit with analysis and design.
8. Design and frequency response of constant 'k' low pass & high pass filters.
9. Design and frequency response of Band pass filter.
10. Design and frequency response of Notch filter.
11. Determination of phase of a sinusoidal signal when passed through RL or RC circuits.
12. Impedance transformation through transformer.

Note:- Ten experiments must be conducted in the semester.

Components & Equipment required:-

-
1. Bread boards, passive components, R, L, and C with different ratings.
 2. Dual power supplies, function generators, CROs.

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(15A56102) ENGINEERING PHYSICS LABORATORY**(Common to All Branches)****Objectives:**

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect
in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed during the I year I semester

1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
2. Determination of wavelength of given source using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle of an optical fiber.
4. Energy gap of a Semiconductor diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss for a given magnetic material.
7. Determination of Crystallite size using X-ray pattern (powder) using debye-scheerer method.
8. Determination of particle size by using laser source.
9. Determination of dispersive power of a prism.

10. Determination of thickness of the thin wire using wedge Method.

11. Laser : Diffraction due to single slit

12. Laser : Diffraction due to double slit

13. Laser: Determination of wavelength using diffraction grating

14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.

15. Synthesis of nanomaterial by any suitable method.

References:

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

Outcomes:

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dielectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.

Would recognize the significant importance of nanomaterials in various engineering fields.

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B. Tech I - II Sem. (EIE)	L	T	P	C
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(15A99201) 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. Crimping 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 II - I Sem. (EIE)

L	T	P	C
3	1	0	3

(15A54301) MATHEMATICS-III
OBJECTIVES:

- This course aims at providing the student with the concepts of Matrices, Numerical Techniques and Curve fitting.

OUTCOMES:

- The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods

UNIT – I

Elementary row transformations-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 – Diagonalization of matrix. Calculation of powers of matrix and inverse of a 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, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

UNIT – III

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT – IV

Curve fitting: Fitting of a straight line – Second degree curve – Exponential curve-Power curve by method of least squares. Numerical Differentiation for Newton's

interpolation formula. Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

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

TEXT BOOKS:

4. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
5. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

REFERENCES:

2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
3. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

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B. Tech II - I Sem. (EIE)	L	T	P	C
	3	1	0	3
(15A04301) ELECTRONIC DEVICES AND CIRCUITS				

Course Objectives:

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.

Course Outcomes:

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

Junction Diode Characteristics : Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.

UNIT- II

Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L- section filter, Π -section filter, Multiple L- section and Multiple Π section filter, comparison of various filter circuits in terms of ripple factors.

UNIT- III

Transistor Characteristics:

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET- types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- IV

Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE} , I_c , and β , Stability factors, (S , S' , S''), Bias compensation, Thermal runaway, Thermal stability.
FET Biasing- methods and stabilization.

UNIT- V

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:

1. J. Millman, C. Halkias, "Electronic Devices and Circuits", Tata Mc-Graw Hill, 4th Edition, 2010.
2. David A. Bell, "Electronic Devices and Circuits", Fifth Edition, Oxford University Press, 2009.
3. Salivahanan, Kumar, Vallavaraj, "Electronic Devices and Circuits", Tata Mc-Graw Hill, Second Edition

REFERENCES:

1. Jacob Millman, C. Halkies, C.D. Parikh, "Integrated Electronics", Tata Mc-Graw Hill, 2009.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson Publications, 9th Edition, 2006.
3. BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, "Electronic Devices and Circuits", Pearson, 2nd edition.

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B. Tech II - I Sem. (EIE)	L	T	P	C
	3	1	0	3

(15A04302) SWITCHING THEORY AND LOGIC DESIGN

Course Objectives:

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

Course Outcomes:

- 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 & Five variable K-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**Combinational Logic Circuits:**

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV**Sequential Logic Circuits:**

Sequential Circuits, Latches, Flips-Flops - RS, JK, Master-Slave JK, D & T flip flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, asynchronous counters.

Asynchronous sequential circuits - Introduction, Analysis Procedure, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards.

UNIT V**Programmable Devices:**

Memory organization, classification of semiconductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD, Flash memories, content addressable memory, programmable logic devices, PROM at PLD, programmable logic array (PLA) programmable array logic (PAL), field programmable gate array (FPGA).

Text Books:

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

References:

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

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B. Tech II - I Sem. (EIE)	L	T	P	C
	3	1	0	3
(15A04303) SIGNALS AND SYSTEMS				

Course objectives:

- 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 Outcomes:

- 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 & SYSTEMS: Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Analogy between vectors and signals-orthogonality-Mean Square error-Fourier series: Trigonometric & Exponential and concept of discrete spectrum

UNIT II

CONTINUOUS TIME FOURIER TRANSFORM: Definition, Computation and properties of Fourier Transform for different types of signals. Statement and proof of sampling theorem of low pass signals

UNIT III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, Relationship between bandwidth and rise time. Energy and Power Spectral Densities

UNIT IV

DISCRETE TIME FOURIER TRANSFORM: Definition, Computation and properties of Fourier Transform for different types of signals.

UNIT V

LAPLACE TRANSFORM: Definition-ROC-Properties-Inverse Laplace transforms-the S-plane and BIBO stability-Transfer functions-System Response to standard signals-Solution of differential equations with initial conditions.

The Z–TRANSFORM: Derivation and definition-ROC-Properties-Linearity, time shifting, change of scale, Z-domain differentiation, differencing, accumulation, convolution in discrete time, initial and final value theorems-Poles and Zeros in Z -plane-The inverse Z-Transform-System analysis-Transfer function-BIBO stability-System Response to standard signals-Solution of difference equations with initial conditions. .

TEXT BOOKS:

1. B. P. Lathi, "Linear Systems and Signals", Second Edition, Oxford University press,
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, "Signals and Systems", Pearson, 2nd Edn.
3. A. Ramakrishna Rao, "Signals and Systems", 2008, TMH.

REFERENCES:

1. Simon Haykin and Van Veen, "Signals & Systems", Wiley, 2nd Edition.
2. B.P. Lathi, "Signals, Systems & Communications", 2009,BS Publications.
3. Michel J. Robert, "Fundamentals of Signals and Systems", MGH International Edition, 2008.
4. C. L. Philips, J. M. Parr and Eve A. Riskin, "Signals, Systems and Transforms", Pearson education.3rd

B. Tech II - I Sem. (EIE)

L	T	P	C
3	1	0	3

(15A02306) ELECTRICAL TECHNOLOGY**Objective:**

Electrical Technology contains Single phase transformers, Induction motors, Synchronous Machines, DC generators and motors. The objective is to study their performance aspects.

UNIT- I DC GENERATORS

D.C. Generators – Principle of Operation – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators- Applications

UNIT – II D.C. MOTORS

D.C Motors – Principle of Operation – Back E.M.F. –Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors-Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Three Point Starter-Losses – Constant & Variable Losses – Calculation of Efficiency - Swinburne’s Test.

UNIT-III SINGLE PHASE TRANSFORMERS

Single Phase Transformers - Constructional Details- Emf Equation - Operation on No Load and on Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency-Regulation-OC and SC Tests – Sumpner’s Test - Predetermination of Efficiency and Regulation.

UNIT-IV 3-PHASE INDUCTION MOTORS

Polyphase Induction Motors-Construction Details of Cage and Wound Rotor Machines- - Principle of Operation – Slip- Rotor Emf and Rotor Frequency - Torque Equation- Torque Slip Characteristics.

UNIT – V SYNCHRONOUS MACHINES

Principle And Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Voltage Regulation by Synchronous Impedance Method- Theory of Operation of Synchronous Motor.

OUTCOME:

After going through this course the student acquires knowledge on basics of DC generators and motors, Transformers, Induction motors and Synchronous Machines.

TEXT BOOKS:

1. Basic Electrical Engineering, V. N. Mittle and Arvind Mittle, Mc Graw Hill (India) Pvt. Ltd., 2nd Edition, 2005.
2. Basic Electrical Engineering, T.K.Nagsarkar and M.S. Sukhija, Oxford University Press, 2nd Edition, 2011.

REFERENCES:

1. Basic Electrical Engineering, M.S.Naidu and S. Kamakshiah, Tata Mc Graw Hill, 3rd Edition, 2009.
2. Electrical and Electronic Technology, Hughes, Pearson Education.

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B. Tech II - I Sem. (EIE)	L	T	P	C
	3	1	0	3

(15A10301) SENSORS & TRANSDUCERS**Course Objective:**

- To provide basic knowledge about sensors and transducers used in Process industry, manufacturing industry and Automated plants.

Learning Outcome:

- Upon completion of the subject, students shall be able to understand the sensors, transducers and their applications in Process control industry, manufacturing industry and Automation plants.

UNIT-1

Definition, principle of sensing & transduction , classification,parameters-Characteristics : static and Dynamic,Characterization.performance characteristics of Instrumentation system.

Mechanical and Electromechanical sensor: Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Strain gauge: Theory, type, materials, design

consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes. Inductive sensor: common types- Reluctance change type, Mutual inductance change type, transformer action type, Magnetostrictive type, brief discussion with respect to material, construction and input output variable, Ferromagnetic plunger type, short analysis. LVDT: Construction, material, output input relationship, I/O curve, discussion. Proximity sensor.

UNIT-II

Capacitive sensors: variable distance-parallel plate type, variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity. Stretched diaphragm type: microphone, response characteristics. Piezoelectric element: piezoelectric effect, charge and voltage coefficient, crystal model, materials, natural & synthetic type, their comparison, force & stress sensing, ultrasonic sensors.

UNIT-III

Thermal sensors: Material expansion type: solid, liquid, gas & vapor, Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermister material, shape, ranges and accuracy specification. Thermoemf sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. **Radiation sensors:** types, characteristics and comparison. Pyroelectric type.

UNIT-IV

Magnetic sensors: Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive celltypes, materials, construction, response. Geiger counters, Scintillation detectors.

UNIT-V

Introduction to smart sensors, MEMS Applications, Nano sensors, on-board automobile sensors, home appliance sensors, aerospace sensors.

Text books:

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1. *Sensor & transducers*, D. Patranabis, 2nd edition, PHI
 2. *Instrumentation Devices & systems*, C.S.Rangan,G R Sama,V S V Mani,2nd Edition McGraw Hill
 3. *Measurement systems: application & design*, E.A.Doebelin, Mc Graw Hill.

Reference:

1. *Sensors and Signal Conditioning*, Ramon Pallas-Areny, John G.Webster,2nd Edition
2. *Sensor Technology Hand Book* – Jon Wilson, Newne 2004.
3. *Instrument Transducers – An Introduction to their Performance and design* – by Herman K.P.Neubrat, Oxford University Press.
4. *Electronic Instrumentation* by H.S.Kalsi.

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B. Tech II - I Sem. (EIE)	L	T	P	C
	0	0	4	2

(15A40305) ELECTRONIC DEVICES AND CIRCUITS LABORATORY
Objectives:

- This Lab provides the students to get an electrical model for various semiconductor 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

Outcomes:

- 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 Resistance Boxes/Rheostats
6. Decade Capacitance Boxes

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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. (EIE)

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0	0	4	2

(15A02307) ELECTRICAL TECHNOLOGY LAB
Objective:

To experiment in detail on DC generators and motors, Transformers, Induction Motors and Synchronous Machines, and evaluate their performance characteristics.

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC compound generator. Determination of characteristics.
4. Brake test on DC shunt motor. Determination of performance curves.
5. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator.
6. Speed control of DC shunt motor.
7. OC & SC Tests on Single-Phase Transformer ((i) Predetermination of Efficiency and Regulation at any given load and Power Factor and (ii) Determination of Equivalent Circuit).
8. Sumpner's Test on a pair of Single Phase Transformers
9. Load test on 3-phase Induction motor
10. No load & Blocked rotor tests on Three phase Induction motor
11. Regulation of a Three –Phase Alternator by Synchronous Impedance Method.
12. V and Inverted V curves of 3-phase Synchronous motor.

Note: Any 10 of the above Experiments are to be conducted

OUTCOMES:

- After going through this laboratory course, the student acquires sufficiently good practical knowledge about the operation, testing, and characteristics of DC

generators and motors, Transformers, Induction Motors and Synchronous Machines.

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B. Tech II - II Sem. (EIE)

L	T	P	C
3	1	0	3

(15A54402) MATHEMATICS –IV
(Common to ECE, EEE)

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

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 – Thomson method.

Conformal mapping: Transformation of e^z , $\ln z$, 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's series – Residue theorem.

Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x) dx$ (b) $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x) dx$

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher

REFERENCES:

1. Mathematics III by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Advanced Engineering Mathematics, Peter V.O'Neil, CENGAGE publisher.
3. Advanced Engineering Mathematics by M.C. Potter, J.L. Goldberg, Edward F.Aboufadel, Oxford.

Outcomes: The student achieves the knowledge to analyse the problems using the methods of special functions and complex variables

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B. Tech II - II Sem. (EIE)

L	T	P	C
3	1	0	3

(15A04401) ELECTRONIC CIRCUIT ANALYSIS
Course Objectives:

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.

Course Outcomes:

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

Feedback Amplifiers : Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of Analysis of Feedback Amplifiers.

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and FET with the relevant analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators with BJT and FET with relevant analysis, Crystal oscillators, Frequency and amplitude stability of oscillators.

UNIT- II
Small Signal High Frequency Transistor Amplifier models:

BJT: Transistor at High Frequencies, Hybrid- π Common Emitter transistor model, Hybrid π conductances, Hybrid π capacitances, Validity of hybrid π model, determination of high-frequency parameters in terms of low-frequency parameters , CE

short circuit current gain, Current gain with resistive load, Cut-off frequencies, Frequency Response and Gain Bandwidth product.

FET: Analysis of Common Source and Common Drain Amplifier circuits at High frequencies.

UNIT – III

Multistage Amplifiers : Classification of amplifiers, Methods of coupling, Cascaded transistor amplifier and its analysis, Analysis of two stage RC coupled amplifier, High input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

UNIT- IV

Power Amplifiers: Class A large signal Amplifiers, Second harmonic Distortions, Higher order harmonic Distortion, Transformer Coupled Audio power amplifier, Efficiency, Push-pull amplifiers, Class B Amplifiers, Class AB operation, Efficiency of Class B Amplifier, Complementary Symmetry push pull amplifier, Class D amplifier, Class S amplifier, MOSFET power amplifier, Thermal stability and Heat sink.

UNIT -V

Tuned Amplifiers : Introduction, Q-Factor, Small Signal Tuned Amplifier – Capacitance single tuned amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Effect of Cascading Double tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers

Text Books:

1. J. Millman and C.C. Halkias, "Integrated Electronics", McGraw-Hill, 1972.
2. Donald A. Neaman, "Electronic Circuit Analysis and Design", McGraw Hill.
3. Salivahanan, N.Suressh Kumar, A. Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill, Second Edition.

References:

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1. Robert T. Paynter, "Introductory Electronic Devices and Circuits", Pearson Education, 7th Edition
 2. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory" Pearson/Prentice Hall, 9th Edition, 2006.
 3. Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.

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B. Tech II - II Sem. (EIE)

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3	1	0	3

(15A04410) PRINCIPLES OF COMMUNICATION**Learning Outcome:**

On successful completion of the module students will be able to

- *explain the main concepts of analogue and digital communication systems;*
- *analyze and design an AM and FM modulator/demodulator;*
- *explain, discuss, and compare different binary digital modulation techniques; explain types of noise & effects of noise on communication system*

UNIT I

Introduction: Block diagram of Electrical communication system, Radio communication : Types of communications, Analog, pulse and digital Types of signals, Noise – Types of noise, sources of noise, calculation of noise in Linear systems, and noise figure.

UNIT II

Amplitude Modulation: Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM : Diode detector, Product demodulation for DSB SC & SSB SC.

Angle Modulation : Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT III

Pulse Modulations: Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT IV

Digital Communication: Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.

Digital Modulation: ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

UNIT V

Information Theory : Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shannon-Fano and Huffman coding.

Error control coding : Introduction, Error detection and correction codes, block codes,

convolution codes.

Text Books:

1. *Communication Systems Analog and Digital* – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. *Principles of Communications* – H. Taub and D. Schilling, TMH, 2003.

Reference Books:

1. *Electronic Communication Systems* – Kennedy and Davis, TMH, 4th edition, 2004.
- Communication Systems Engineering* – John. G. Proakis and Masoud Salehi, PHI, 2nd Ed. 2004.

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(15A0411) 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
MULTIVBRATORS

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 IV 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.

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(15A02303) CONTROL SYSTEMS ENGINEERING
OBJECTIVES:

To make the students learn about:

- Merits and demerits of open loop and closed loop systems; the effects of feedback
- The use of block diagram algebra and Mason's gain formula to find the effective transfer function between two nodes
- Transient and steady state responses , time domain specifications
- The concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- The fundamental aspects of modern control

UNIT – I INTRODUCTION

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

UNIT – III STABILITY

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, Lag-Lead Compensator design in frequency Domain.

UNIT – V STATE SPACE ANALYSIS

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

OUTCOMES:

After completing the course, the student should be able to do the following:

- Evaluate the effective transfer function of a system from input to output using (i) block diagram reduction techniques (ii) Mason's gain formula
- Compute the steady state errors and transient response characteristics for a given system and excitation
- Determine the absolute stability and relative stability of a system
- Draw root loci
- Design a compensator to accomplish desired performance
- Derive state space model of a given physical system and solve the state equation

TEXT BOOKS:

1. Modern Control Engineering, Katsuhiko Ogata, PEARSON, 1st Impression 2015.
2. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International Publishers, 5th edition, 2007, Reprint 2012.

REFERENCE BOOKS:

1. Automatic Control Systems, Farid Golnaraghi and Benjamin. C. Kuo, WILEY, 9th Edition, 2010.
 2. Control Systems, Dhanesh N. Manik, CENGAGE Learning, 2012.
- John J D'Azzo and C. H. Houpis , "Linear Control System Analysis and Design: Conventional and Modern", McGraw - Hill Book Company, 1988.

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3	1	0	3

(15A01408) FLUID MECHANICS AND HYDRAULIC MACHINERY**UNIT I**

INTRODUCTION: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids. Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

KINEMATICS OF FLUID MOTION: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet.

UNIT II

DYNAMICS OF FLUID FLOW: Forces acting on a Fluid in Motion; Euler's equation of motion;

.Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend.

Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube, pitot-static tube.

CLOSED CONDUIT FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

UNIT- III

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Torque and head transferred in roto dynamic machines.

HYDRAULIC TURBINES-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency, working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

UNIT IV

HYDRAULIC TURBINES-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

CENTRIFUGAL PUMPS: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies.

UNIT V

HYDRO ELECTRIC POWER STATION: Development of hydro power in Andhra Pradesh and India; Classification of hydel plants- runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ;Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing ,draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; , hydrographs, Flow duration curve; Power duration curve; Load duration curve; Load curve ; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

Text Books:

1. *Hydraulics & Fluid Mechanics* by P. N. Modi & S. N. Seth; Standard Book house, New Delhi
2. *Fluid Mechanics & Hydraulic Machines* by Dr. R. K. Bansal; Laxmi Publications, New Delhi.

Reference Books

1. *Hydraulic Machines* by Jagdish Lal, Metropolitan.
2. *Fluid Mechanics* by A. K. Jain; Khanna Publishers, Delhi
3. *Fluid mechanics and fluid machines* by Rajput, S.Chand &Co.
4. *Fluid Mechanics & Fluid Power Engineering* by D.S. Kumar Kataria & Sons.
5. *Fluid Mechanics, Hydraulics and Hydraulic Machines* by K R Arora, Standard Publishers
6. *Engineering Fluid Mechanics* by Kumar K.L., Eurasia Publishing House (P) Ltd., New Delhi

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(15A04404) ELECTRONIC CIRCUIT ANALYSIS LABORATORY

Note: The students are required to design the electronic circuit and they have to perform the analysis through simulator using Multisim/Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory.

Objectives

- 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

Outcomes:

- 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.

PART A: List of Experiments :(Minimum of Ten Experiments has to be performed)

1. Determination of f_r of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt's Oscillator

-
6. Two Stage RC Coupled Amplifier
 7. Darlington Pair Amplifier
 8. Bootstrapped Emitter Follower
 9. Class A Series-fed Power Amplifier
 10. Transformer-coupled Class A Power Amplifier
 11. Class B Push-Pull Power Amplifier
 12. Complementary Symmetry Class B Push-Pull Power Amplifier
 13. Single Tuned Voltage Amplifier
 14. Double Tuned Voltage Amplifier

PART B: Equipment required for Laboratory**Software:**

- i. Multisim/ Pspice/Equivalent Licensed simulation software tool
- ii. Computer Systems with required specifications

Hardware:

13. Regulated Power supplies
 14. Analog/Digital Storage Oscilloscopes
 15. Analog/Digital Function Generators
 16. Digital Multimeters
 17. Decade Résistance Boxes/Rheostats
 18. Decade Capacitance Boxes
 19. Ammeters (Analog or Digital)
 20. Voltmeters (Analog or Digital)
 21. Active & Passive Electronic Components
 22. Bread Boards
 23. Connecting Wires
- CRO Probes etc.

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B. Tech II - II Sem. (EIE)	L	T	P	C
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(15A10401) INSTRUMENTATION LABORATORY
Course Objective:

Hands on experience in industrial instrumentation

Learning Outcome:

The students are expected to acquire practical knowledge of the instruments used in any industry.

(Minimum TEN experiments should be performed)

1. Extension of Range of DC Ammeter, Voltmeter
2. Extension of Range of AC Voltmeter, Ammeter
3. Construction of series & shunt type ohm meters using PMMC
4. RLC and Q measurement using Q-meter
5. Study of strain gauges using any one application
6. Measurement of temperature using RTD
7. Measurement of linear displacement using LVDT
8. Study of capacitive transducers
9. Measurement of resistance using wheat stone bridge / Kelvin bridge
10. Measurement of capacitance using shearing bridge
11. Measurement of inductance using maxwell's bridge
12. Characteristics of Opto- Electric Transducers (photo transistor, photo diode, LDR)
13. Piezoelectric transducers
14. Bourdon tube
15. Acceleration transducers

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B. Tech III-I Sem. (EIE)	L	T	P	C
	3	1	0	3
15A52301	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS			

Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

Unit I:**INTRODUCTION TO MANAGERIAL ECONOMICS**

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. **Demand Analysis:** Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

UNIT II:**THEORY OF PRODUCTION AND COST ANALYSIS**

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis:** Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

UNIT III:**INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT**

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

UNIT IV:**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 – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

UNIT V:**CAPITAL AND CAPITAL BUDGETING**

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Short term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Course Outcome: After completion of this course, the student will be able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

TEXT BOOKS:

1. Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2. Financial Management, I.M.Pandey, Vikas Publications, 2013.

REFERENCES

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.
3. Accounting and Financial Management, T.S.Reddy & Y. Hariprasad Reddy, Margham Publishers.

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B. Tech III-I Sem. (EIE)	L	T	P	C
	3	1	0	3
15A04503 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS				

Course Objectives:

- Design of OPAMPS, Classification of OPAMPs.
- To study and design various linear applications of OPAMPs.
- To study and design various non linear applications of OPAMPs

Course Outcomes:

- 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.
- Realize the importance of Operational Amplifier.

UNIT – I

Differential Amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator.

Operational amplifiers: Introduction, Block diagram, Ideal op-amp, Equivalent Circuit, Voltage Transfer curve, open loop op-amp configurations. Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

UNIT-II

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

DC and AC amplifiers, peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter,

integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas biquad filter.

UNIT-IV

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, analog multiplier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

UNIT V

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.LalKishore, "Operational Amplifiers and Linear Integrated Circuits", Pearson Education, 2007.

REFERENCES:

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICs", PHI, 4th edition, 1987.
2. R.F.Coughlin& Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits", 6th Edition, PHI.
3. David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd edition, 2010.

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B. Tech III-I Sem. (EIE)	L	T	P	C
	3	1	0	3
15A10501 DIGITAL IC APPLICATIONS				

UNIT I

CMOS LOGIC& BIPOLAR LOGIC AND INTERFACING: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families. 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, data flow 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 modes for the above ICs. Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder.

UNIT IV

SEQUENTIAL LOGIC DESIGN: Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

UNIT V:**Memory Design using VHDL**

ROMs: Internal structure, 2D-decoding commercial types, timing and applications.

Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS.

Dynamic RAM: Internal structure, timing, synchronous DRAMS, Familiarity with Component Data Sheets – Cypress CY6116, CY7C1006, Specifications.

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.

REFERENCES:

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.

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B. Tech III-I Sem. (EIE)	L	T	P	C
	3	1	0	3
15A10502 VIRTUAL INSTRUMENTATION				

Course Objective:

1. To understand what is Virtual instrumentation and to realize the architecture of VI.
2. To familiarize with the VI software and learn programming in VI.
3. To study various Instrument Interfacing and data acquisition methods.
4. To understand various analysis tools and develop programs for Process control applications.

Course Outcome:

Enable students to understand basics, programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

UNIT I

REVIEW OF VIRTUAL INSTRUMENTATION Historical perspective – Need of VI – Advantages of VI – Define VI – Block diagram & Architecture of VI – Data flow techniques – Graphical programming in data flow – Comparison with conventional programming.

UNIT II

PROGRAMMING TECHNIQUES: VI's and sub-VI's – Loops and charts – Arrays – Clusters – Graphs – Case & sequence structures – Formula nodes – Local and global variable – String & file input.

UNIT III

DATA ACQUISITION BASICS : DIO -Counters and timers – PC Hardware structure – Timing – Interrupts – DMA – Software and Hardware Installation – GPIB/IEEE 488 concepts – Embedded system buses – PCI – EISA – CPCI.

UNIT IV

COMMON INSTRUMENT INTERFACES : Current loop – RS 232C/RS 485 – Interface basics: USB – PCMCIA – VXI – SCXI – PXI – networking basics for office and industrial application VISA and IVI – Image acquisition and processing – Motion Control – DMM – Waveform generator.

UNIT V

USE OF ANALYSIS TOOLS AND APPLICATION OF VI: Fourier transforms – Power spectrum – Correlation methods – Windowing and flittering – Pressure control system – Flow control system – Level control system– Temperature data acquisition system – Motion control employing stepper motor – PID controller tool box.

TEXT BOOKS

1. Dr. Sumathi. S and Prof. Surekha. P, “LabVIEW Based Advanced nstrumentation Systems”, 2nd edition, 2007.
2. Gary Johnson, “LabVIEW Graphical Programming”, McGraw Hill, 2006.

REFERENCES

1. Lisa .K, Wells and Jeffrey Travis, “LABVIEW for Everyone”, Prentice Hall, 2009.
2. Skolkoff, “Basic concepts of LABVIEW 4”, PHI, 1998.
3. Gupta. S, Gupta. J.P, “PC Interfacing for Data Acquisition and Process Control”, ISA, 1994. 4. Amy. L.T, “Automation System for Control and Data Acquisition”, ISA, 1992.

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B. Tech III-I Sem. (EIE)	L	T	P	C
15A10503 ELECTRONIC MEASUREMENTS & INSTRUMENTATION	3	1	0	3

Course Objective: To provide the knowledge required to understand and analyze the Instruments used for measurement of various electrical parameters

Course Outcome:

The student is expected to apply the knowledge that they acquired during their course in EDC, ECA and PDC to study and design electronic instruments.

UNIT 1

SINE-WAVE, SQUARE-WAVE AND PULSE TESTING OF LINEAR SYSTEMS

Mathematical Background, Gain or Loss Measurement, The Measurement of Phase, Automatic Network Analyzers, Measurement of Delay Distortion, The Measurement of Loop Gain, The Measurement of Nonlinearity, Precautions in Sine-wave Testing. Tools and Techniques, Relations between Transient and Sinusoidal Responses, Response to Generalized Inputs, Effect of Low-end Cutoffs on Square-wave Response, Time-domain Reflectometry.

UNIT II

DIRECT-CURRENT INSTRUMENT AMPLIFIERS

Direct-current Amplifier Considerations, Direct-current Amplifier with Automatic Reset, Differential Amplifiers, Chopper Amplifiers.

UNIT III

VOLTAGE AND CURRENT MEASUREMENTS

Introduction to DVMs, Non-integrating Types of DVMs, Digital Voltmeters with Counting Circuitry, Normal-mode Rejection, Common-mode Rejection, Principles of AC Voltage Measurements, Average-responding Detectors, Peak-responding Detectors, Peak-to-peak Detection, Root-mean-square— responding Detectors, Other Detection Methods, Sampling Voltmeters, Synchronous Detection, Direct-current Probes, Alternating-current Probe

UNIT IV

IMPEDANCE MEASUREMENT

Definitions and Formulas, Components and Standards –Resistors, Capacitors, Inductors, Meter Methods to Measure Impedance -Direct—current meter, Capacitance and Inductance Meters, Complex Impedance Meters, Resistance and Impedance Comparators, Direct-current Bridges-The Wheatstone Bridge, Measurement of Low-

valued Resistors, Measurement of High-valued Resistance

UNIT V

BRIDGES, TRANSMITTERS AND RECEIVERS

Low-frequency Bridges- General, Classification of Four-arm Bridges, Bridges with Inductively Coupled Ratio Arms, Special-purpose Bridges, Automatic and Semiautomatic Bridges, Radio-frequency Impedance Measurements, Problems at Radio Frequency, Radio-frequency Bridges, T Networks, Resonance Methods, The RF Meter Methods, Precision Measurements- Standardization of Impedance Unit, Methods of Precision Measurements.

General-performance Characteristics, Basic Measurements, Special System Measurements, Measurements on Receiving Systems, Sensitivity, Modulation-acceptance Bandwidth, Correlation of Sensitivity with Noise Figure, Automatic-gain-control Characteristics, Measurements on Transmitting Systems, Radio Equipment Specifications, Microwave Transistor Oscillators, Solid-state Microwave Amplifiers, Other Solid-state Microwave Sources.

Text Books:

1. Electronic Measurement and Instrumentation –Oliver and Cage –TMH.
2. Electronic Instrumentation and Measurements - David A. Bell—Oxford- 2nd Edition.

Reference Books:

1. Principles of measurement systems, John P. Bentley: 3rd edition, Addison Wesley Longman, 2000.
2. Measuring Systems, Application and Design by E.O. Doebelin, McGraw Hill.
3. Electrical and Electronic Measurements by Shawney, Khanna Publ.
4. Electronic Instrumentation and measurements by David A. Bell, 2nd Edition, PHI, 2003.
5. Electronic instruments and instrumentation Technology by M.M.S. Anand: Prentice-Hall of India,2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-I Sem. (EIE)	L	T	P	C
	3	1	0	3

**15A05402 COMPUTER ORGANIZATION
(MOOCS-I)**

Course Objectives:

- 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

Course Outcomes:

- 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:

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.

Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

Unit II:

Arithmetic: Addition and Subtraction of Signed Numbers, Design and Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multiprogrammed Control.

Unit III:

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

Unit IV:

Input/output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

Unit V:

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General-Purpose, Interconnection Networks.

Textbook:

1) "Computer Organization", Carl Hamacher, Zvonko Vranesic, Safwat Zaky, McGraw Hill Education, 5th Edition, 2013.

Reference Textbooks:

1. Computer System Architecture, M.Morris Mano, Pearson Education, 3rd Edition.
2. Computer Organization and Architecture, Themes and Variations, Alan Clements, CENGAGE Learning.
3. Computer Organization and Architecture, Smruti Ranjan Sarangi, McGraw Hill Education.
4. Computer Architecture and Organization, John P.Hayes, McGraw Hill Education.

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3	1	0	3

**15A12401 OPERATING SYSTEMS
(MOOCS-I)**
Course Objective:

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications.

Course Outcome:

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

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

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

UNIT II

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

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

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

UNIT III

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

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

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

UNIT IV

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

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

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

UNIT V

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

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

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

Text Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley , Eight Edition, 2014.

Reference Books:

1. Operating systems by A K Sharma, Universities Press,
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.

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6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
 7. Operating Systems, R.Elmasri, A.G.Carrick and D.Levine, Mc Graw Hill.
 8. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
 9. Operating System Design, Douglas Comer, CRC Press, 2nd Edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-I Sem. (EIE)	L	T	P	C
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15A10504	LINEAR AND DIGITAL IC APPLICATIONS LABORATORY			

Course Objective:

To provide exposure to the student about use of Linear and Digital Integrated Circuits

Course Outcome:

The student will be able to use Linear and Digital Integrated Circuits for different practical applications

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 ICs using VHDL / VERILOG and verify the operations of the Digital ICs (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

For Software Simulation

1. Computer Systems
2. LAN Connections (Optional)
3. Operating Systems
4. VHDL/ VERILOG
5. FPGAS/CPLDS (Download Tools)

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B. Tech III-I Sem. (EIE)	L	T	P	C
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15A10505 VIRTUAL INSTRUMENTATION LABORATORY
Course Objective:

1. To familiarize with the VI software and learn programming in VI.
2. To experiment various functions available in LabVIEW.
3. To practice various Instrument Interfacing and data acquisition methods.

Course Outcome:

To get practical knowledge in programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

Experiments are to be performed using LAB VIEW Software
(Minimum TEN experiments should be performed)

LIST OF EXPERIMENTS

1. Verification of Arithmetic Operations.
2. Verification of Half Adder and Full adder.
3. Program to find Addition of First n natural numbers using for and while loop.
4. Implementation of Array functions.
5. Program for implementing Seven segment display.
6. Program to perform Traffic light control.
7. Calculation of BMI using cluster.
8. Program to control Temperature by using RTD and DAQ .
9. Program to control Temperature by using Thermocouple and DAQ
10. Program to control Temperature by using Thermister and DAQ
11. Program for controlling the Flow of water using DAQ.
12. Program for controlling the Level of water using DAQ.
13. Program for Pressure control using DAQ.
14. Program for controlling the speed of a DC motor using PID tool box

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B. Tech III-I Sem. (EIE)	L	T	P	C
	2	0	2	0

15A99501 SOCIAL VALUES & ETHICS (AUDIT COURSE)

(Common to all Branches)

UNIT - I

Introduction and Basic Concepts of Society: Family and Society: Concept of family, community, PRIs and other community based organizations and society, growing up in the family – dynamics and impact, Human values, Gender Justice.

Channels of Youth Moments for National Building: NSS & NCC: History, philosophy, aims & objectives; Emblems, flags, mottos, songs, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries. **Nehru Yuva Kendra (NYK):** Activities – Socio Cultural and Sports.

UNIT – II

Activities of NSS, NCC, NYK:

Citizenship: Basic Features Constitution of India, Fundamental Rights and Fundamental Duties, Human Rights, Consumer awareness and the legal rights of the consumer, RTI.

Youth and Crime: Sociological and psychological Factors influencing youth crime, Peer Mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice

Social Harmony and National Integration: Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

UNIT – III

Environment Issues: Environment conservation, enrichment and Sustainability, Climate change, Waste management, Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).

Health, Hygiene & Sanitation: Definition, needs and scope of health education, Food and Nutrition, Safe drinking water, Sanitation, Swachh Bharat Abhiyan.

Disaster Management: Introduction to Disaster Management, classification of disasters, Role of youth in Disaster Management. Home Nursing, First Aid.

Civil/ Self Defense: Civil defense services, aims and objectives of civil defense, Need for self defense training – Teakwondo, Judo, karate etc.,

UNIT – IV

Gender Sensitization: Understanding Gender – Gender inequality – Role of Family, Society and State; Challenges – Declining Sex Ratio – Sexual Harassment – Domestic Violence; Gender Equality – Initiatives of Government – Schemes, Law; Initiates of NGOs – Awareness, Movements;

UNIT - V

Physical Education : Games & Sports: Health and Recreation – Biological basis of Physical activity – benefits of exercise – Physical, Psychological, Social; Physiology of Muscular Activity, Respiration, Blood Circulation.

Yoga: Basics of Yoga – Yoga Protocol, Postures, Asanas, Pranayama: Introduction of Kriyas, Bandhas and Mudras.

TEXT BOOKS:

1. NSS MANUAL
2. SOCIETY AND ENVIRONMENT: A.S.Chauha, Jain Brothers Publications, 6th Edition, 2006
3. INDIAN SOCIAL PROBLEM: G.R.Madan, Asian Publisher House
4. INDIAN SOCIAL PROBLEM: Ram Ahuja, Rawat Publications
5. HUMAN SOCIETY: Kingsley Davis, Macmillan
6. SOCIETY: Mac Iver D Page, Macmillan
7. SOCIOLOGY – THEMES AND PERSPECTIVES: Michael Honalambos, Oxford University Press
8. CONSTITUTION OF INDIA: D.D.Basu, Lexis Nexis Butterworth Publishers
9. National Youth Policy 2014 (available on www.yas.nic.in)
10. TOWARDS A WORLD OF EQUALS: A.Suneetha, Uma Bhrugudanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagraj, Asma Rasheed, Gogu Shyamala, Deepa Streenivas and Susie Tharu
11. LIGHT ON YOGA : B.K.S.Iyengar, Penguin Random House Publishers

www.un.org

www.india.gov.in

www.yas.nic.in

<http://www.who.int/countries/ind/en/>

<http://www.ndma.gov.in>

<http://ayush.gov.in/event/common-yoga-protocol-2016-0>

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B. Tech III-II Sem. (EIE)	L	T	P	C
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15A10601 ANALYTICAL INSTRUMENTATION				

Course Objective:

Provide a solid background in the fundamental concepts and methods of spectroscopy, chromatography & environmental pollution and an appreciation of issues in each of these fields in current research.

Course Outcome:

On successful completion of the module students will be able to:

- Acquire knowledge about the interaction of electromagnetic radiations with matter and apply analytical techniques to accurately determine the elements present in the given sample.
- Select Instrument for a particular analysis with come idea of its merits, demerits and limitations
- Learn specific technique employed for monitoring different pollutants in air and water.
- They can understand the applications and usage of chromatography in real time industrial environments

UNIT I

Electromagnetic radiation – different regions, their wavelengths, frequencies and energies - interaction of EM radiations with matter – atomic, molecular, electronic interaction - Basic principles of spectroscopy – emission and absorption of radiations – resonance - radiation sources – dispersing and resolving techniques – detectors - typical atomic emission and absorption spectrographs in the UV and visible region.

UNIT II

Molecular spectra – electronic, vibrational and rotational energies and spectra characteristic bands of radicals, OH, CH, CO, etc., - IR absorption - spectroscopy – single and double beam spectrophotometers - instrumentation techniques for analyzing solid, liquid and gaseous samples – sample handling techniques.

UNIT III

Microwave spectroscopy – NMR, ESR and EPR spectroscopy – basic principles – instrumentation techniques and applications - principles of ion optics – ion sources – single focusing and double focusing mass spectrometers – principles and application

UNIT IV

Principles of X-ray fluorescence spectrometry and flame photometry – detection of X-rays and nuclear radiations – ionization chamber - proportional counter – GM counter - scintillation counter - solid state detector - gamma ray spectrometers – isotope dilution and tracer techniques for quantitative estimation and analysis.

UNIT V

Electrochemical methods – electrical conductivity of liquids conductivity and water purity – practical measurements and application – sulphur dioxide monitor – determination of pH – oxygen analyzers. Principles of gas and liquid chromatography – process chromatography– operation of typical process chromatography.

Text Books:

1. H.H. Willard, L.L. Merrit, J.A. Dean and F.A. Settle, Instrumental methods of Analysis, 6th edition - CBS Publishers and Distributors, 1986.
2. B.E. Noltingk (Edtr.) Jone's Instrument Technology, Vol. 2, Fourth Edition, Butterworths, 1986 (chapters 4 &5 for unit 5)

Reference Books:

1. D.A. Skoog and D.M. West, Principles of Instrumental Analysis, 2nd edition, Holt-Saunders, 1980.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-II Sem. (EIE)	L	T	P	C
	3	1	0	3
15A04601 MICROPROCESSORS AND MICROCONTROLLERS				

Course Objectives:

- To understand the architecture of 8086 MICROPROCESSOR.
- To learn various 8086 Instruction set and Assembler Directives.
- To learn 8051 assembly Language programming

Course Outcomes:

After completion of this subject the students will be able to :

1. Do programming with 8086 microprocessors
2. Understand concepts of Intel x86 series of processors
3. Program MSP 430 for designing any basic Embedded System
4. Design and implement some specific real time applications
Using MSP 430 low power microcontroller.

UNIT I

Introduction-8086 Architecture-Block Diagram, Register Organization, Flag Register, Pin Diagram, Timing and Control Signals, System Timing Diagrams, Memory Segmentation, Interrupt structure of 8086 and Interrupt Vector Table. Memory organization and memory banks accessing.

UNIT II

Instruction Formats -Addressing Modes-Instruction Set of 8086, Assembler Directives-Macros and Procedures.- Sorting, Multiplication, Division and multi byte arithmetic code conversion. String Manipulation instructions-Simple ALPs.

UNIT III

Low power RISC MSP430 – block diagram, features and architecture, Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, MSP430x5x series block diagram, Addressing modes, Instruction set Memory address space, on-chip peripherals (analog and digital), and Register sets. Sample embedded system on MSP430 microcontroller.

UNIT-IV

I/O ports pull up/down resistors concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.

Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

UNIT-V:

Serial communication basics, Synchronous/Asynchronous interfaces (like UART, USB, SPI, and I2C). UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices. Implementing Embedded Wi-Fi using CC3100

Text Books:

1. "Microprocessor and Microcontrollers", N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Oxford Publishers. 1 st Edition, 2010
2. "The X86 Microprocessors , Architecture, Programming and Inerfacing" , Lyla B. Das, Pearson Publications, 2010
3. MSP430 microcontroller basics. John H. Davies, Newnes Publication, I st Edition, 2008

References:

http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode
http://processors.wiki.ti.com/index.php/MSP430_16-Bit_Ultra-Low_Power_MCU_Training

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B. Tech III-II Sem. (EIE)

L	T	P	C
3	1	0	3

15A10602 PROCESS CONTROL
Course Objective:

To provide the students with the knowledge on process characteristics and different control schemes for different process

Course Outcome:

- To study the characteristics of various process characteristics
- To understand the functions of process Control elements
- To study the Characteristics of PID controller, Automanual transfer and tuning methods.
- To study the various control schemes.
- To understand the Multivariable Control

UNIT I

PROCESS CHARACTERISTICS: Terms and Objectives, Incentives for process Control – design aspects of a Process Control System- Classification of variables. Process Equation, Process variables, Degrees of freedom. Characteristics of liquid system, gas system, thermal system. Mathematical modelling of processes. Self regulating-Servo and Regulatory, Interacting and Non-Interacting process – inverse response.

UNIT II

PROCESS CONTROL ELEMENTS: Signal conversion - I/P, P/I Converters, Pneumatic and Electric actuators, Valve Positioner-Control Valve – Characteristics of Control Valves-Types of control valves-control valve sizing- cavitation and flashing. Dynamics of batch and Continuous process.

UNIT III

CONTROLLER: - Basic control actions – Discontinuous control mode, Continuous control mode- Proportional, Single speed floating, Integral and Derivative– Composite control modes – P+I, P+D and P+I+D control modes. Response of controller for different types of test inputs –Integral windup – Auto manual transfer. Selection of control mode for different processes – Typical control schemes for level flow, pressure and temperature.

CONTROLLER TUNING: – Zeigler and Nichols open and Closed loop methods, Performance indices–Based on evaluation criteria – ISE, IAE, ITAE.

UNIT IV

VARIOUS CONTROL SYSTEMS : Feed Forward Control ,Cascade control , Ratio control,Over ride control, Split range control , Selective control ,Adaptive control, Inferential control.

UNIT V

MULTIVARIABLE CONTROL: Introduction -Control loop interaction –motivation – general pairing problem- relative gain array-properties- application of RGA- RGA sensitivity zeros and performance limitation –scaling consideration-block diagram analysis- decoupling design of non interacting control loops Piping and Instrumentation Diagram, Instrument terms and Symbols. Introduction to Intelligent controllers.

Text Books:

1. C.Stephanopoulos, –Chemical process controll, Prentice Hall of India. 1998.
2. Singh, _ Process Controll PHI Learning, 2009

Reference Books:

1. D.P. Eckman, –Automatic Process Controll, Wiley Eastern Ltd., 1972.
2. D.R. Coughanowr, –Process System Analysis and Controll, Second Edition, McGraw Hill 1991.
3. K. Ogata, –Modern Control Engineering, Prentice Hall of India, 1982.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-II Sem. (EIE)	L	T	P	C
	3	1	0	3
15A10603 POWER PLANT INSTRUMENTATION				

Course Objective:

Able to introduce various methods of power generation and specially provide the knowledge of instrumentation and control in thermal power plants.

Course Outcome:

Upon completion of this course the student shall be able to apply his knowledge and understand how instrumentation system designed for a power plant.

UNIT I**OVERVIEW OF POWER GENERATION**

Brief survey of methods of power generation-Hydro, thermal, nuclear, solar, wind, ocean etc. Importance of Instrumentation and control in power generation, piping and instrumentation diagram, Cogeneration of power, Control Rooms.

UNIT II**BOILER MANAGEMENT SYSTEM**

Building block for boiler, boiler feed water circulation, measurements in water circuits, boiler drum level control, superheated steam temperature control, steam pressure control, feed water treatment, air-fuel circuit, measurement of pressure temperature flow level in air fuel circuit, combustion control, furnace draft control, deaerator control.

UNIT III**TURBO SUPERVISORY SYSTEM**

Principles of steam turbine and gas turbine, condenser vacuum control, inlet and outlet measurements, governors, gland steam exhaust pressure control, speed vibration shell temperature monitoring and control, lubricating oil temperature control, generator cooling.

UNIT IV**POWER PLANT MANAGEMENT**

Introduction, Master Control, Combustion Process, Boiler Efficiency, Maintenance of Measuring Instruments, Intrinsic and Electrical Safety, Interlocks for Boiler Operation, Computer based Control and Data Logging Systems, Distributed Control Systems.

UNIT V**ANALYZERS IN POWER PLANTS**

Impurities in raw water, fuel analyzers, pH meter, conductivity meter, chromatography, oxygen measurement in flue gas, measurement of exhaust gas temperature, carbon dioxide measurement, combustion analyzer, infrared flue gas analyzer, smoke detector, dust monitor, pollution monitoring instruments.

Text Books:

1. *Power Plant Instrumentation* by K. Krishnaswamy, M. Ponni Bala, M. Ponni Bala PHI Learning Pvt. Ltd., 2011.
2. *Modern Power station practice, vol. 6, Instrumentation, controls and testing*, Pergamon press, Oxford, 1971.

Reference Books:

1. *Power-Plant Control and Instrumentation: The Control of Boilers and Hrsg Systems*, [David Lindsey](#) IET, 2000.
2. *Pow Plant Engg*, [Nag](#), Tata McGraw-Hill Education, 07-Aug-2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-II Sem. (EIE)	L	T	P	C
	3	1	0	3
15A10604 INDUSTRIAL INSTRUMENTATION				

Course Objective:

To study the various parameter like vacuum, pressure, temperature, floe, level, force, torque, velocity torque, nuclear radiation, used in process industry, power plants manufacturing and automation plants.

Course Outcome:

Upon completion of the subject, the students shall be able to understand how the various process parameters are measured.

UNIT I**PRESSURE AND TEMPERATURE MEASUREMENT**

Vacuum and low pressure measurement using Monometer, McLeod Gage, Knudsen Gage, Ionization Gases, Thermal conductivity. Pressure measurement using bourdon gages, capsule gages, bellows, pressure transmitter, dead weight tester, force balance, vibration cylinder, dual gage techniques, and calibration.

Temperature standards, fixed points, filled system thermometers, bimetallic thermometer, types of thermocouple, laws of thermocouples, cold junction compensation, RTD, 2wire,3wire, 4wire connections, thermistor and linearization, IC sensors, optical and radiation pyrometers, calibration.

UNIT II**FLOW AND LEVEL MEASUREMENT**

Solid flow measurement, Flow equation, flow measurement in pipelines, liquid and gas rotameter, head type, positive displacement, vortex type, hotwire anemometer, electromagnetic type, ultrasonic type, laser Doppler velocimeter, mass flow meter, gas flow meter, selection criteria, calibration.

Solid level measurement, visual technique, float operated devices, displacer devices, pressure gage method, diaphragm type, differential pressure method, boiler drum level, electrical methods, conductive sensor, capacitive sensor, ultrasonic type, purging techniques.

UNIT III**FORCE AND TORQUE MEASUREMENT**

Force measurement, different methods, gyroscopic method, vibrating wire sensor, strain gage type, calibration.

Definition of torque, different methods, dynamometer, gyroscope, calibration.

UNIT IV**VELOCITY AND ACCELERATION MEASUREMENT**

Relative velocity, translational and rotational velocity measurement, velocity of rotating machinery, speed measurement using tachometer, electrical and magnetic types, revolution counter, proximity type, photo electric type, stroboscope. Acceleration- accelerometer- different types-measurement in rotating machinery- calibration.

UNIT V**OTHER MEASUREMENTS**

Nuclear radiation fundamentals, radiation detector, sound level meter, microphone, hydrophone, humidity and moisture measurement, overview of density measurement, measurement of chemical composition, smoke measurement, pollution measurement, clean room and measurement of particles.

Text Books:

1. Measurement systems-Application and Design- by Doebelin, 4/e, McGraw Hill International, 1990.
2. Mechanical measurements by A.K Shawney, Khanna publishers.
3. Instrumentation by C.S.Rangan, Mani and Sharma, Tata McGraw Hill publishing.

Reference Books:

1. Process Instruments and Control Handbook by D.M Considine, 4/e, McGraw Hill International, 1993.
2. Mechanical and Industrial Measurements by R.K.Jain, Khanna Publishers, 1986.
3. Instrument Technology, vol,1 by E.B.Jones, Butterworths, 1981.

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B. Tech III-II Sem. (EIE)	L	T	P	C
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**15A04603 DIGITAL SIGNAL PROCESSING
(CBCC-I)**

Course Objectives:

- Program a DSP chip to filter signals using either assembly language or a C compiler for the chip.
- Use Z transforms and discrete time Fourier transforms to analyze a digital system.

Course Outcomes:

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

- Formulate engineering problems in terms of DSP tasks.
- Apply engineering problems solving strategies to DSP problems.
- Design and test DSP algorithms.
- Analyze digital and analog signals and systems.
- Analyze and compare different signal processing strategies.

UNIT-I

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

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

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

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

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

TEXT BOOKS:

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

REFERENCES:

1. A.V.Oppenheim and R.W. Schaffer, & J R Buck, "Discrete Time Signal Processing," 2nd ed., Pearson Education, 2012.
2. B. P. Lathi, "Principles of Signal Processing and Linear Systems," Oxford Univ. Press, 2011.
3. Li Tan, Jean Jiang, "Digital Signal Processing, Fundamentals and Applications," Academic Press, Second Edition, 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-II Sem. (EIE)

L	T	P	C
3	1	0	3

**15A10605 PC BASED INSTRUMENTATION
(CBCC-I)**
Course Objective:

1. It is to provide and ensure a comprehensive understanding of using personal computers in measurement and control instrumentation.
2. Learn the process of collecting information/ data through PC from real world sources.
3. Learn remote and networked data acquisition and operating system.
4. Learn programmable logic controllers, and its application.

UNIT –I**Introduction to Computer Instrument Communication:**

Personal Computer, Overview of operating System, I/O Ports, Plug-in-slots, PCI bus, Operators Interface. Computer Interfacing for Data Acquisition and Control – Interfacing Input Signals, Output system with continuous actuators. Data Acquisition and Control using Standard Cards: PC expansion systems, Plug-in Data Acquisition Boards; Transducer to Control room, Backplane bus – VXI.

UNIT –II**Programmable logic controller (PLC) basics:**

Definition, Overview of PLC systems, input/output modules, Power supplies and Isolators.

Basic PLC programming:

Programming On-Off inputs/ outputs. Creating Ladder diagrams, Basic PLC functions, PLC Basic Functions, register basics, timer functions, counter functions.

UNIT – III**PLC intermediate and advanced functions:**

Arithmetic functions, Number comparison functions, Skip and MCR functions, data move systems. Utilizing digital bits, sequencer functions, Matrix functions. PLC Advanced functions: Analog PLC operation, Networking of PLC

UNIT –IV**Application of PLC:**

Controlling of Robot using PLC, PID control of continuous processes, Continuous Bottle-filling system, Batch mixing system, 3-stage air conditioning system, Automatic frequency control of Induction heating.

UNIT – V**Related Topics:**

Alternate programming languages. Auxiliary commands and functions. PLC installation, troubleshooting and maintenance. Field bus: Introduction, concept. HART protocol: Method of operation, structure, and applications. Smart transmitters, smart valves and smart actuators.

Text Books

1. *Programmable Logic Controllers – Principles and Applications*, John. W .Webb Ronald A Reis , Fourth edition, Prentice Hall Inc., New Jersey, 1998.
2. *Computer Control of Processes – M.Chidambaram. Narosa 2003*

References

1. PC Based Instrumentation and Control Third Edition by Mike Tooley ; Elsevier.
2. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control. By Kevin James; Elsevier.
3. Practical Data Acquisition for Instrumentation and Control Systems by John Park and Steve Mackay.
4. Distributed Control Systems, Lukcas M.P, Van Nostrand Reinhold Co., New York, 1986. Programmable Logic Controllers, Second edition, Frank D. Petruzella, Mc Graw Hill, Newyork, 1997.
5. Programmable Logic Controllers Programming methods and applications- Prentice Hall by. John R. Hackworth and Frederick D. Hackworth, Jr.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B. Tech III-II Sem. (EIE)

L	T	P	C
3	1	0	3

**15A10606 AUTOMOTIVE ELECTRONICS
(CBCC-I)**
Course Objective:

To make the students to understand the basic principle of conventional automobile and its replacement by modern electronic system.

Course Outcome:

The students understand how the conventional automotive subsystems are replaced by modern electronic systems , their relative advantages and comfort.

UNIT I
INTRODUCTION TO AUTOMOTIVE INDUSTRY AND MODERN AUTOMOTIVE SYSTEMS

Vehicle classifications and specifications, Introduction to modern automotive systems and need for electronics in automobiles, Application areas of electronics in the automobiles, Sensors and actuators, Possibilities and challenges in the automotive industry, Enabling technologies and industry trends

UNIT II
SPARK AND COMPRESSION IGNITION ENGINES

Ignition systems, Fuel delivery systems, Engine control functions, Fuel control, Calculation of injector pulse width and injection strategies, Ignition timing control, Lambda control, Engine control modes, Engine control diagnostics

UNIT III
TRANSMISSION CONTROL, BRAKING AND ELECTRONIC STABILITY CONTROL

Automotive transmissions- Transmission fundamentals- Types- Components, Introduction to electronic transmission control- Shift point control- Lockup control-torque converter clutch- Engine torque control during shifting, Safety and diagnostic functions, Improvement of shift quality, vehicle braking fundamentals, Vehicle dynamics during

Braking, brake system components, introduction to antilock braking systems, components and control logic, electronic stability and other technologies

UNIT IV
STEERING CONTROL:

Steering system basics, fundamentals of electronically controlled power steering types, electronically controlled hydraulic system, electric power steering

UNIT V**AUTOMOTIVE ELECTRONICS FOR PASSENGER SAFETY AND CONVENIENCE**

Air bag and seat belt pretension systems- sensor functions, distributed front air bag sensing systems-single-point sensing systems- side-impact sensing- future occupant protection systems, tire pressure monitoring systems, configuration of systems such as power seats-power windows-remote keyless entry systems, types of hybrid vehicles-configurations- main components of hybrid Vehicles.

Text Books:

1. Tom Denton, –*Automobile Electrical and Electronics Systems*||, Edward Arnold Publishers, 2000.
2. William B. Ribbens, –*Understanding Automotive Electronics*||, 5th edition, Newnes Publishing, 2000.

Reference Books:

1. Barry Hollembeak, –*Automotive Electricity, Electronics & Computer Controls*||, Delmar Publishers, 2001.
2. *Fuel System and Emission controls*||, Check Chart Publication, 2000.
3. Ronald. K. Jurgon, –*Automotive Electronics Handbook*||, McGraw-Hill, 1999.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-II Sem. (EIE)	L	T	P	C
	3	1	0	3
15A01608	INTELLECTUAL PROPERTY RIGHTS (CBC-C-I)			

COURSE OBJECTIVE:

This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations.

UNIT – I

Introduction To Intellectual Property: Introduction, Types Of Intellectual Property, International Organizations, Agencies And Treaties, Importance Of Intellectual Property Rights.

UNIT – II

Trade Marks : Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT – III

Law Of Copy Rights : Fundamental Of Copy Right Law, Originality Of Material, Rights Of Reproduction, Rights To Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law. Law Of Patents : Foundation Of Patent Law, Patent Searching Process, Ownership Rights And Transfer

UNIT – IV

Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secrete Litigation. Unfair Competition : Misappropriation Right Of Publicity, False Advertising.

UNIT – V

New Developments Of Intellectual Property: New Developments In Trade Mark Law ; Copy Right Law, Patent Law, Intellectual Property Audits. International Overview On Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development In Trade Secrets Law.

TEXT BOOKS & REFERENCES:

1. Intellectual Property Rights, Deborah. E. Bouchoux, Cengage Learning.
2. Intellectual Property Rights– Unleashmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,

Course Outcomes:

On completion of this course, the student will have an understanding of the following:

- a) *Intellectual Property Rights and what they mean*
- b) *Trade Marks and Patents and how to register them*
- c) *Laws Protecting the Trade Marks and Patents*
- d) *Copy Right and laws related to it.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech III-II Sem. (EIE)	L	T	P	C
	0	0	4	2
15A10607 PROCESS CONTROL LABORATORY				

Course Objective:

To understand practical aspect of process industries

Course Outcome:

Students can understand the closed loop control of various processes

Modeling of single capacity level process from experimental Reactive curve.

Obtain PID Turing parameters from the model.

1. Modeling of single capacity level process from experimental Reactive curve. Obtain PID Turing parameters from the model.
2. Modeling of Two capacity level process.
3. Modeling of two capacity interacting level process by semi log method.
4. Modeling of Thermal process from reaction curve and obtain tuning parameters from the model.
5. Modeling of Thermal process.
6. Closed loop control of flow process.
7. Closed loop control of level process.
8. Closed loop control of Thermal Process.
9. Closed loop control of Pressure process.
10. Inherent and Installed characteristic study of linear, equal percentage and quick opening valves.

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B. Tech III-II Sem. (EIE)	L	T	P	C
	0	0	4	2
15A10608	ANALYTICAL INSTRUMENTATION LABORATORY			

Course Objectives:

1. *Students will be introduced to modern analytical instruments with the goal of providing them with the tools.*
2. *The emphasis will be a "hands-on" approach with sample preparation, application, method development, data analysis and interpretation being key elements.*
3. *Interpret data derived from any analytical instruments.*

Course Outcomes:

1. *Apply basic lab safety rules while working in analytical instrumentation laboratories*
2. *Apply basic analytical processes and sampling procedures and perform them in the lab*
3. *Apply the basic principles of spectroscopy and work in real time with it.*
4. *Perform simple analytical procedures on given samples using Ultraviolet or Infrared Spectrophotometers leading to applied research.*

(Minimum 10 experiments should be completed)

1. Gas analyzers.
2. Gas and liquid chromatography.
3. Spectrometer: UV and VIS spectrometer.
4. Spectrometer: IR and FT IR Spectrometer.
5. Flame photometer.
6. Measurement of calorific value.
7. Mass spectrometer.
8. pH measurement.
9. Interfacing of ADC to PC and observe the data.
10. Interfacing of DAC to PC and generate various types of signals.
11. Serial communication through RS-232C between μ Cs / PCs.
12. Data transfer through IEEE-1394 (firewire) interface.
13. Data Acquisition System
14. Nuclear radiation detector.
15. Water Purity meter
16. Digital Conductivity meter
17. Digital Turbidity meter

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B. Tech III-II Sem. (EIE)	L	T	P	C
	0	0	2	0
15A52602 ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS (AELCS) LAB (Audit Course)				

1. INTRODUCTION

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. 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 and to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Taking part in social and professional communication.

2. COURSE OBJECTIVES:

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.

3. SYLLABUS

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

UNIT-I: COMMUNICATION SKILLS

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary Development
4. Common Errors

UNIT-II: WRITING SKILLS

1. Report writing
2. Resume Preparation
3. E-mail Writing

UNIT-III: PRESENTATION SKILLS

1. Oral presentation
2. Power point presentation
3. Poster presentation

UNIT-IV: GETTING READY FOR JOB

1. Debates
2. Group discussions
3. Job Interviews

UNIT-V: INTERPERSONAL SKILL

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes

4. LEARNING OUTCOMES:

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

5. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) 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

6. SUGGESTED SOFTWARE:

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

1. **Walden Infotech: Advanced English Communication Skills Lab**
2. **K-VAN SOLUTIONS-Advanced English Language Communication Skillslab**
3. **DELTA's key to the Next Generation TOEFL Test: Advanced SkillsPractice.**
4. **TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)**
5. **Train2success.com**

7. BOOKS RECOMMENDED:

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 3rd Edn. 2015.
3. **Essay Writing for Exams, Audrone Raskauskiene, Irena Ragaisience & Ramute Zemaitience,OUP, 2016**
4. **Soft Skills for Everyone**, Butterfield Jeff, Cengage Publications, 2011.
5. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. **Campus to Corporate**, Gangadhar Joshi, Sage Publications, 2015
7. **Communicative English**,E Suresh Kumar & P.Sreehari, Orient Blackswan, 2009.
8. **English for Success in Competitive Exams**, Philip Sunil Solomon OUP, 2015

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B. Tech IV-I Sem. (EIE)	L	T	P	C
	3	1	0	3

15A52601 MANAGEMENT SCIENCE

Course Objective: *The objective of the course is to equip the student the fundamental knowledge of management science and its application for effective management of human resource, materials and operation of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.*

UNIT –I

Introduction to Management: Concept-Nature and Importance of Management, Functions-Evaluation of Scientific Management, Modern management-Motivation Theories-Leadership Styles-Decision Making-Process-Designing Organization Structure-Principles and Types of Organization.

UNIT- II

Operations Management: Plant location and Layout, Methods of production, Work-Study-Statistical Quality Control through Control Charts, Objectives of Inventory Management, Need for Inventory Control-EOQ&ABC Analysis(Simple Problems)**Marketing Management:** Meaning,Nature, Functions of Marketing, Marketing Mix, Channels of distribution- Advertisement and sales promotion-Marketing strategies-Product Life Cycle.

UNIT –III

Human Resource Management(HRM): Significant and Basic functions of HRM- Human Resource Planning(HRP), Job evaluation, Recruitment and Selection, Placement and Induction-Wage and Salary administration. Employee Training and development-Methods-Performance Appraisal-Employee Grievances-techniques of handling Grievances.

UNIT –IV

Strategic Management: Vision, Mission, Goals and Strategy- Corporate Planning Process-Environmental Scanning-SWOT analysis-Different Steps in Strateg Formulation, Implementation and Evaluation. **Project Management:** Network Analysis- PERT, CPM, Identifying Critical Path-Probability-Project Cost Analysis, Project Crashing (Simple Problems).

UNIT-V

Contemporary Management Practices: Basic concepts of MIS-Materials Requirement Planning(MRP),Just-In-Time(JIT)System, Total Quality Management(TQM)-Six Sigma and Capability Maturity Models(CMM) evies, Supply Chain Management, Enterprise Resource Planning(ERP),Performance Management, Business Process Outsourcing(BPO), Business Process Re-Engineering and Bench Marking, Balance Score Card.

Course 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 management decisions on physical and human resources of an organization. Beside the knowledge of Management Science facilitates for his/her personal and professional development.

TEXT BOOKS:

1. A.R Aryasri: Management Science, TMH, 2013
2. Kumar /Rao/Chalill 'Introduction to Management Science' Cengage, Delhi, 2012.

REFERENCE BOOKS:

1. A.K.Gupta "Engineering Management",S.CHAND, New Delhi, 2016.
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.
3. Kotler Philip & Keller Kevin Lane: Marketing Mangement , PHI,2013.
4. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
5. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
6. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
7. Parnell: Strategic Management, Biztantra, 2003.
8. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B. Tech IV-I Sem. (EIE)

L	T	P	C
3	1	0	3

15A10701 PLC AND SCADA
Course Objective:

1. To study the fundamentals of Data Acquisition system
2. To teach the concept of PLC and the Programming using Ladder Diagram
3. To understand the basics of SCADA and communication standards

Course Outcome:

1. Students will have the knowledge of data acquisition System
2. Students will be able to write Programs using ladder diagrams
3. Students will have the knowledge of SCADA, communication standards and various network protocol

UNIT-I
INTRODUCTION TO PLC

Definition & History of PLC, Overall PLC system, PLC Input and Output modules, CPU & Programmer/Monitors, Solid state memory, the processor, Input Module (Interfaces), Power supplies, PLC advantages & disadvantages, selection criteria for PLC.

UNIT-II
PROGRAMMING OF PLC

Programming equipments, Proper construction of PLC ladder diagram, Basic components & their symbols in ladder diagram, Fundamentals of ladder diagram, Boolean logic & relay logic, and analysis of rungs. Input ON/OFF switching devices, Input analog devices, Output ON/OFF devices, Output analog devices, Programming ON/OFF Inputs to produce ON/OFF outputs. PLC timer function-PLC counter functions.

UNIT-III
INTRODUCTION TO SCADA

Introduction and brief history of SCADA, Fundamental principles of modern SCADA systems, SCADA hardware, SCADA software, Landlines for SCADA, Modern use in SCADA system, computer sites and troubleshooting, system implementation.

UNIT-IV
SCADA SYSTEM, HARDWARE AND FIRMWARE

Comparison of terms SCADA, Distributed Control Systems (DCS), PLC and smart instrument, considerations and benefits of SCADA system, Remote Terminal Units (RTUs): Control Processor, Analog input & output module, Digital input & output

module, communication Interfaces, Power supply module for RTU, Application program, PLC used as RTUs, Master station, System reliability and availability, communication architecture and philosophies.

UNIT-V

THE EVOLUTION OF SCADA PROTOCOLS

Overview of Open System Interconnection (OSI) Model, Functions of OSI Model Layers, OSI Protocols, Functions of Transmission Control Protocol/ Internet Protocol (TCP/IP), DNP3 Protocol, IEC61850 layered architecture, CIP protocol, DeviceNet, ControlNet, EtherNet/IP, Flexible Function Block Process (FFB), Process Field bus (profibus), The security Implications of SCADA protocols.

TEXT BOOKS

1. John W Webb, Ronald A. Reis, "Programmable Logic Controllers: Principles and Application", Pearson Education, 5th Edition.
2. David Bailey, Edwin Wright, "Practical SCADA for Industry", Newns, An Imprint of Elsevier, 2003.

REFERENCES

1. Ronald L Krutz "Securing SCADA system", Wiley publishing, 2006
2. John R. Hackworth, Fredrick D, Hackworth Jr., "Programmable Logic Controllers: Programming Methods and applications"
3. Gordan Clark, Deem Reynders, "Practical Modem SCADA Protocols"
4. Gary Dunning, "Introduction to Programmable Logic Controllers" , Thomson, 2nd Edition.

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B. Tech IV-I Sem. (EIE)	L	T	P	C
	3	1	0	3
15A04702 EMBEDDED SYSTEMS				

Course Objectives:

- To understand the fundamental concepts of Embedded systems.
- To learn the kernel of RTOS, architecture of ARM processor.

Course Outcomes:

After completion the students will be able to

- Design of embedded systems leading to 32-bit application development.
- Understand hardware-interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.
- Review and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world.
- Understand Embedded Networking and IoT concepts based upon connected MCUs

UNIT-I**Introduction to Embedded Systems**

Embedded system introduction, host and target concept, embedded applications, features and architecture considerations for embedded systems- ROM, RAM, timers; data and address bus concept, Embedded Processor and their types, Memory types, overview of design process of embedded systems, programming languages and tools for embedded design

UNIT-II**Embedded processor architecture**

CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture. Introduction to ARM architecture and Cortex – M series, Introduction to the TM4C family viz. TM4C123x & TM4C129x and its targeted applications. TM4C block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

UNIT- III**Overview of Microcontroller and Embedded Systems**

Embedded hardware and various building blocks, Processor Selection for an Embedded System, Interfacing Processor, Memories and I/O Devices, I/O Devices and I/O interfacing concepts, Timer and Counting Devices, Serial Communication and Advanced I/O, Buses between the Networked Multiple Devices.

Embedded System Design and Co-design Issues in System Development Process, Design Cycle in the Development Phase for an Embedded System, Uses of Target System or its Emulator and In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System

Design metrics of embedded systems - low power, high performance, engineering cost, time-to-market.

UNIT-IV

Microcontroller fundamentals for basic programming

I/O pin multiplexing, pull up/down registers, GPIO control, Memory Mapped Peripherals, programming System registers, Watchdog Timer, need of low power for embedded systems, System Clocks and control, Hibernation Module on TM4C, Active vs Standby current consumption. Introduction to Interrupts, Interrupt vector table, interrupt programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

Unit-V

Embedded communications protocols and Internet of things

Synchronous/Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, Implementing and programming UART, SPI and I2C, SPI interface using TM4C. Case Study: Tiva based embedded system application using the interface protocols for communication with external devices "Sensor Hub BoosterPack"

Embedded Networking fundamentals, IoT overview and architecture, Overview of wireless sensor networks and design examples. Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi, User APIs for Wireless and Networking applications Building IoT applications using CC3100 user API.

Case Study: Tiva based Embedded Networking Application: "Smart Plug with Remote Disconnect and Wi-Fi Connectivity"

Text Books:

1. Embedded Systems: Real-Time Interfacing to ARM Cortex-M Microcontrollers, 2014, Create space publications ISBN: 978-1463590154.
2. Embedded Systems: Introduction to ARM Cortex - M Microcontrollers, 5th edition
Jonathan W Valvano, Createspace publications ISBN-13: 978-1477508992

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3. Embedded Systems 2E Raj Kamal, Tata McGraw-Hill Education, 2011 ISBN-0070667640, 9780070667648

References:

1. http://processors.wiki.ti.com/index.php/Hands-On_Training_for_TI_Embedded_Processors
2. http://processors.wiki.ti.com/index.php/MCU_Day_Internet_of_Things_2013_Workshop
3. http://www.ti.com/ww/en/simplelink_embedded_wi-fi/home.html
4. CC3100/CC3200 SimpleLink™ Wi-Fi® Internet-on-a-Chip User Guide Texas Instruments Literature Number: SWRU368A April 2014–Revised August 2015.

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B. Tech IV-I Sem. (EIE)

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3	1	0	3

15A10702 BIOMEDICAL INSTRUMENTATION

Course Objective: To learn the physiology of the human body and the Instrumentation related to Biomedical Systems.

Course Outcome: On successful completion of the module students will be able to:
 To introduce the concepts of physiology and the Electrical Components of a Biomedical System. To discuss the measurement of physiological parameters.
 To understand the concepts of Imaging System and Telemetry and the various Therapeutic Equipments used in Medicine.

UNIT I

ELECTRO PHYSIOLOGY: Review of Physiology and anatomy – sources of Bioelectric Potentials – Resting and Action Potentials – Propagation of Action Potentials – Electrodes theory – Bio potential electrodes – Bio chemical transducers – Transducers for Bio Medical applications.

UNIT II

BIOMEDICAL RECORDERS AND CARDIOVASCULAR MEASUREMENT: Physiology of cardiovascular and nervous system – ECE-EEE-EME – Foetal ECE-Phonocardiography –Vector Cardiography – Holtel monitoring – BP – Blood flow – cardiac output – ICCU – Bedside unit and central monitoring unit.

UNIT III

PULMONARY MEASUREMENT AND BIO TELEMETRY: Physiology of respiratory system –Respiratory rate measurement – wire and wireless Biotelemetry – Telemetering multiple information – implanted transmitters – sources of electrical hazards and safety techniques.

UNIT IV

MEDICAL IMAGING SYSTEM: Ultrasound scanner – Echo cardiography – Colour Doppler system – CAT and CT scan – MRI Imaging – Cine angiogram – LASER Imaging –Endoscope.

UNIT V

THERAPEUTIC UNITS: Physiotherapy and Electrotherapy - Short wave, Microwave diathermy –Defibrillators – Cardio vector – Hearing aid – dialysis machine.

Text Books:

1. *R.Anandanatarajan, –Biomedical Instrumentation*, PHI Learning, 2011.

Reference Books: .

1. *Leshie Cromwell, Fred. J. Weibell and Erich. A. Pfeiffer, –Biomedical Instrumentation and Measurements*, 2nd Edition, PHI, 2003.
2. *R.S. Khandpar, –Hand Book of Biomedical Instrumentation and measurement*, McGraw Hill publishing Co., 1990.
3. *Aston, –Principles of Biomedical Instrumentation and measurements*, McGraw Hill publishing Co., 1990.

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B. Tech IV-I Sem. (EIE)	L	T	P	C
	3	1	0	3
15A04604	VLSI DESIGN (CBCC-II)			

Course Objectives:

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

Course Outcomes:

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

UNIT-I

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

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

UNIT-II

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

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, $2\mu\text{m}$ 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

REFERENCES:

1. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 1999.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 1997.
3. John P. Uyemura, "Chip Design for Submicron VLSI: CMOS layout and Simulation", 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. (EIE)	L	T	P	C
15A10703	3	1	0	3
	OPTO ELECTRONICS & LASER INSTRUMENTATION (CBCC-II)			

Course Objective:

To make the students understand the application of Opto Electronics and Lasers in instrumentation industries.

Course Outcome:

Upon completion of this course the student shall be able to apply his instrumentation knowledge and understand how light and LASER can be used for measurements.

UNIT I**OPTICAL FIBERS AND THEIR PROPERTIES**

Introduction to optical fiber , fiber characteristics, principles of light propagation through a fiber, Different types of fibers and their properties, Losses in the optical fiber, Dispersion, advantages and limitations of optical fibers

UNIT II**OPTO-ELECTRONIC COMPONENTS**

Optical sources- LED- LD, Optical detectors- PIN- APD, Electro-optic, Magneto optic and Acousto-optic Modulators.

UNIT III**INDUSTRIAL APPLICATIONS OF OPTICAL FIBERS**

Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope – Polarization maintaining fibers – Applications

UNIT IV**LASER FUNDAMENTALS**

Introduction to lasers - Laser characteristics – Laser configuration – Three level and four level lasers – Q-switching – Mode locking – Types of lasers: Gas lasers, Solid lasers, Liquid lasers and Semiconductor lasers

UNIT V**INDUSTRIAL APPLICATIONS OF LASER**

Industrial applications of lasers – Lasers for measurement of distance, length, velocity,

acceleration, current, voltage. Bio-medical applications. Holography- Principle, Methods. Holographic Interferometers and applications.

Text Books:

1. *Optical Fiber Communication – Principles and Practice*, J.M. Senior, , Prentice Hall of India, 1985.
2. *Introduction to Opto Electronics*, J. Wilson and J.F.B. Hawkes, Prentice Hall of India, 2001.

Reference Books:

1. Understanding Fiber Optics, 4th or 5th edition; Jeff Hecht; Prentice Hall publishers
2. Optical Fibre Communication and Sensors, M. Arumugam, Anuradha Agencies, 2002.
3. 3. Optical Fibre Communication, G. Keiser, McGraw Hill, 1995.
4. Lasers: Theory and Applications – by Thyagarajan K. and Ghatak A.K., Plenum Press Monte Ross, Laser Applications, McGraw Hill, 1968.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-I Sem. (EIE)

L	T	P	C
3	1	0	3

**15A10704 DIGITAL CONTROL SYSTEMS
(CBCS-II)**
Course Objectives:

1. To equip the students with the basic knowledge of A/D and D/A conversion
2. To understand the basics of Z- Transform
3. To study the stability analysis of digital control system
4. To equip the basic knowledge of digital process control design

UNIT-I**Z-PLANE Analysis of Discrete-Time Control System**

Introduction to Digital Control System, Review of Z-Transforms, Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane. Modified Z-Transforms.

UNIT – II**State Space Analysis**

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

UNIT – III**Controllability and Observability**

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

Stability analysis-Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation with Routh Stability criterion.

UNIT – IV**Design of Discrete Time Control System by Conventional Methods**

Transient and steady – State response Analysis – Design based on the frequency response method –Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – V State Feedback Controllers and Observers

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order, minimum order and Reduced order observers.

Text Books:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH

References:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
B. Tech IV-I Sem. (EIE)

L	T	P	C
3	1	0	3

15A10705
**INDUSTRIAL SAFETY AND MANAGEMENT
(CBCC-III)**
Course Objective:
To understand the importance of industrial safety
Course Outcome:
Students will acquire knowledge on the Industrial safety and management
UNIT I

Energy conversion – world fossil fuel reserves – world energy consumption – historical lives of fossil fuels – global energy and environmental management – environmental aspects of fossil, nuclear, hydro and biomass energy conversion – gaseous emissions – solid waste – liquid waste.

UNIT II

Energy management – need for energy conservation – energy auditing – conducting real time continuous energy audits – data collection – automated data acquisition – data analysis – role of energy manager – energy audit instruments – gas analyzer – energy conservation in industries: boilers, pumps, fans, compressed air systems, refrigeration and air conditioning systems, DG sets, electrical motors, variable speed motors.

UNIT III

Air pollutants and global climate – air pollutant effects. Pollution control laws and regulation –national and international – role of environmental monitoring in environmental management systems – continuous emissions monitoring systems. Pollution control – review of pollution control methods in thermal power plants – industrial – nuclear – automobiles – disposal/treatment of solid and liquid wastes – alternate fuels.

UNIT IV

Safety and productivity – causes of accidents in industries – accidents reporting and investigation –measuring safety performance – workman compensation rules.

UNIT V

Safety codes and standards – general safety considerations in power plants, pressure vessels and pressurized pipe lines – operation and inspection of extinguishers – preventing the spread of fire –emergency exit facilities.

Text Books:

1. Blake Roland. P, "Industrial safety", Prentice Hall of India, 1973.
2. Callaghan. P. O, "Energy Management", McGraw Hill Book Co., 1993.

Reference Books:

1. Culp. A. W, "Principles of Energy Conservation", McGraw Hill Book Co., 1991.
2. Noel de Nervers, "Air Pollution Control Engineering", McGraw Hill Book Co., 2000.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-I Sem. (EIE)	L	T	P	C
	3	1	0	3
15A10706 SYSTEM DESIGN USING MICROCONTROLLERS (CBCC-III)				

Course Objective:

- *To introduce system design concepts to students using microcontrollers with foundational concepts of microcontroller architecture and programming .*
- *To introduce hardware and software integration for real time systems using microcontrollers and thereby imparting real time system design knowledge to students.*

Course Outcome:

- *Foundational knowledge in activating and using a generic microcontroller. Preliminary design considerations for system level implementation.*
- *Knowledge of 8051 Microcontroller hardware features and internal peripherals.*
- *Programming knowledge of 8051 microcontrollers.*
- *Knowledge of PIC Microcontroller hardware features and internal peripherals.*
- *Programming knowledge of PIC microcontrollers.*
- *Software design techniques to be followed for embedded system designing.*
- *Using real time operating systems for embedded systems.*

UNIT I

REVIEW OF MICROCONTROLLERS: Features of Typical Microcontroller – on Board peripherals – Processor Selection criteria – Microcontroller Design Specifications – Word length – Performance Issues - Power consumption – Package Types – Electrical requirements – Reset Hardware – oscillator Design – power Consideration - Development Tools –Firmware Development options – Assembly Language Vs High level Language Programming.

UNIT II

MCS51 MICROCONTROLLER AND INTERFACING: Intel MCS51 Architecture – Derivatives - Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing ,Introduction to 16 bit Microcontroller

UNIT III

PIC MICROCONTROLLER AND INTERFACING: Introduction, CPU architecture,

registers, instruction sets addressing modes Loop timing, timers, Interrupts, Interrupt timing, I/O Expansion, I²C Bus Operation Serial EEPROM, Analog to digital converter, UART-Baud Rate-Data Handling-Initialization, Special Features - serial Programming-Parallel Slave Port.

UNIT IV

SOFTWARE DEVELOPMENT AND TOOLS: Embedded system evolution trends. Round -Robin, robin with Interrupts, function-One-Scheduling Architecture, Algorithms. Introduction to-assembler-compiler-cross compilers and Integrated Development Environment (IDE). Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

UNIT V

REAL TIME OPERATING SYSTEMS: Task and Task States, tasks and data, semaphores and shared Data Operating system Services-Message queues-Timer Function-Events-Memory

Management, Interrupt Routines in an RTOS environment, basic design Using RTOS. System Design Issues – Design of Industrial Control System.

Content beyond the Syllabus:

Introduction to ARM processors and programming NXP LPC2148 microcontroller.

Text Books:

1. *David E Simon, " An embedded software primer ", Pearson education Asia, 2001.*
2. *Mohammed Ali Mazidi and Janice Gillispie Mazidi, – The 8051 Microcontroller and Embedded SystemI, Pearson Education Asia, New Delhi, 2006.*

Reference Books:

1. *Burns, Alan and Wellings, Andy, " Real-Time Systems and Programming Languages ", Second Edition. Harlow: Addison-Wesley-Longman, 1997.*
2. *Raymond J.A. Bhur and Donald L.Biale, " An Introduction to real time systems: Design to networking with C/C++ ", Prentice Hall Inc. New Jersey, 1999.*
3. *Grehan Moore, and Cyliax, " Real time Programming: A guide to 32 Bit Embedded Development. Reading " Addison-Wesley-Longman, 1998.*

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-II Sem. (EIE)	L	T	P	C
	3	1	0	3

**15A10707 TELEMETRY & TELECONTROL
(CBCC-III)**

Course Objective:

- *The subject Telemetry and Telecontrol enables the students to understand how various process parameters in the industry are transmitted and controlled from remote place.*

Course Outcome:

- *The students shall apply the knowledge of transducers, communications, optical communications and satellite communication in understanding the subject. The students understand how process industry and automation plants are controlled from remote place*

UNIT I**TELEMETRY PRINCIPLES**

Introduction, Functional blocks of telemetry, Classification of telemetry, design factors considered in selection of telemetry, cable telemetry-2 wire-3 wire-4 wire, pneumatic telemetry, hydraulic telemetry, mechanical telemetry, distance considerations, limitations, telemetry through power line carrier.

UNIT II**WIRELESS TELEMETRY**

Functional block, frequency consideration, IRIG standard, line and channel coding, modulation codes, intersymbol interference, frequency division multiplexing-frequency modulation- FM and PM circuits, time division multiplexing- TDM/PAM-PAM/PM-TDM/PCM-PCM system, transmitter circuits, receiver circuits, PCM reception, interference, noise consideration. Bio telemetry. Study of migration of birds using telemetry. Case study.

UNIT III**SATELLITE TELEMETRY**

Principle of satellite telemetry, block diagram, selection of frequency, telemetry tracking and command system, noise consideration, ship to shore telemetry using satellite, analog and digital transmission. Example of satellite telemetry system.

UNIT IV**OPTICAL TELEMETRY**

Principle of optical telemetry, block diagram, advantages, optical fiber cable, types of fiber cables, light transmission, sources and detector, transmission and receiving circuits, coherent optical fiber communication, power and link budget, losses, Case study.

UNIT V**TELECONTROL**

Principle of Telecontrol, block diagram, design aspects, telecontrol instruments, analog and digital techniques in telecontrol, telecontrol using information theory. Remote adjustments, guidance and regulation. Example of Telecontrol system.

Text Books:

1. *Telemetry principles* by D. Patranabis, TMH.
2. *Telecontrol Methods and Applications of telemetry and Remote control* by G. Swoboda, Reinhold Publishing Corporation, London, 1991.

Reference Books:

1. *Handbook of Telemetry and Remote control* by L. Gruenberg, McGraw Hill, New York, 1987.
2. *Telemetry Engineering* by R.E. Young, Little Books Ltd, London, 1988.
3. *Data Communication and Teleprocessing System* by T. Housley, PH Intl, Englewood Cliffs, New Jersey, 1987.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-II Sem. (EIE)	L	T	P	C
	0	0	4	2
15A10708	PLC LABORATORY			

Course Objective:

- *Students can understand the importance of computerization of process industries*

Course Outcome

- *Students can capable to use computers and PLC's in process systems*
1. Programming a PLC to demonstrate control of a device using one push button, Generating square wave etc.
 2. Programming a PLC to demonstrate an operation of Batch process.
 3. Configuring and Implementation of programmable PID controllers.
 4. Control of a process using dead beat algorithm using simulation.
 5. Control of a process using Dahlings algorithm using simulation.
 6. PC based control of flow process.
 7. PC based control of level process.
 8. PC based control of pressure process.
 9. PC based control of Thermal process.
 10. Online Identification of process parameters from experimental data by least square estimate method.

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B. Tech IV-II Sem. (EIE)

L	T	P	C
0	0	4	2

15A10709 MICROPROCESSORS AND EMBEDDED SYSTEMS LABORATORY
Course Objective:

To provide practical knowledge of Microcontrollers and concept Embedded Systems

Course Outcome:

Student shall be able to design and implement any Electronic Circuit with Micro Controller

1. Embedded systems lab Experiments using 8051
2. To develop program for basic mathematical operations.
3. To develop a program for block operations
4. To develop a program to generate square wave over port pins.
5. To develop a program to read keyboard and code
6. To develop a program to drive stepper motor
7. To develop a program for temperature indicator using ADC

Experiments using PIC Microcontroller

- 1) Asynchronous serial communication
- 2) Pulse Width Modulation (PWM) using CCP module
- 3) DC motor control

Microprocessors & Embedded Systems Lab Experiments
Phase1:

Normal programming

Phase 2:

Interfacing

Phase 1:

1. Design an assembly language program to perform the different arithmetic operations on the operands
2. Design a program for conversion of binded data to un-binded data.
3. Write a program which accepts input from key board and perform the factorial of the given input using interrupts.
4. Design a program which defines locality of the operands.
5. Write a program to reverse a given string.
6. Write a program to search a character in the given string.

Phase 2:

- 1) Write an ALP to generate Sinusoidal Wave Using 8255
- 2) Interface 8251 (USART) with 8086.

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B. Tech IV-II Sem. (EIE)	L	T	P	C
	3	1	0	3

**15A10801 DIGITAL IMAGE PROCESSING
(MOOCS-II)**

Course Outcomes:

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

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Text Books:

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

References:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-II Sem. (EIE)	L	T	P	C
	3	1	0	3
15A10802 MEMS AND ITS APPLICATIONS (MOOCS-II)				

Course Objectives:

- To study about fabrication processes involved in different types of sensors.
- To Study about characteristics of different MEMS materials.
- To get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Course Outcomes:

After completion of this course the students will be able to

- Understand different steps involved in fabrication processes of different types of sensors.
- Understand characteristics of different MEMS materials.
- Get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Unit-I:**MEMS Fabrication processes & Sensors:**

Introduction, MEMS Overview, Micro-fabrication of MEMS: Surface Micromachining, Bulk Micromachining, LIGA, micromachining of polymeric MEMS devices, Three-dimensional micro-fabrications. Electromechanical transducers: Piezoelectric transducers, Electro-strictive transducers, Magneto-strictive transducers, Electrostatic actuators, Electromagnetic transducers, Electro-dynamic transducers, Electro-thermal actuators, comparison of electro-thermal actuation process, Micro-sensing for MEMS: Piezo-resistive sensing, Capacitive sensing, Piezoelectric sensing, Resonant sensing, Surface Acoustic Wave sensors.

Unit-II:

MEMS Materials and Fabrication techniques: Metals, semiconductors, thin films for MEMS and their deposition techniques, materials for polymer MEMS, Bulk micromachining for silicon based MEMS, Silicon surface micromachining, Micro-stereolithography for polymer MEMS.

Unit-III:

MEMS Switches and Micro relays: Switch parameters, basics of switching, Switches for RF and microwave applications, actuation mechanisms for MEMS devices, bistable micro relays and micro-actuators, dynamics of switch operation, MEMS switch design considerations, modeling and evaluation.

Unit- IV:

MEMS Inductors and Capacitors: MEMS Micro-machined passive elements: pros and cons, MEMS Inductors: self and mutual inductance, micro-machined inductors, reduction of stray capacitance, improvement of quality factor, folded inductors, modeling and design issues of planar inductors, variable inductor and polymer based inductor. MEMS Capacitors: MEMS gap tuning capacitor, MEMS area tuning capacitor, Dielectric Tunable capacitors.

Unit-V:

MEMS packaging & MEMS RF Applications: MEMS packaging: Role of MEMS packaging, Types of MEMS packaging, flip-chip and multichip Unit packaging, RF MEMS packaging issues. MEMS RF applications: Micro-machined transmission line and components, micro-machined RF Filters, Micro-machined Phase shifters, and Micro-machined antenna, Gyros and Bio-MEMS.

References:

1. Gabriel M. Rebeiz, "RF MEMS: Theory, Design, and Technology," John Wiley & Sons, 2003.
2. Vijay K. Varadan, K. J. Vinoy and K. A. Jose, "RF MEMS & Their Applications," John Wiley & Sons, 2003.
3. Tai-Ran Hsu, "MEMS and Microsystems: Design and Manufacture," McGraw-Hill.

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B. Tech IV-II Sem. (EIE)	L	T	P	C
	3	1	0	3

**15A10803 MECHATRONICS FOR INSTRUMENTATION
(MOOCS-III)**

COURSE OBJECTIVE:

- *To understand the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical and Electronic Systems.*

UNIT I**MECHATRONICS, SENSORS AND TRANSDUCERS**

Introduction to Mechatronics Systems Measurement Systems Control Systems Microprocessor based Controllers. Sensors and Transducers Performance Terminology Sensors for Displacement, Position and Proximity; Velocity, Motion, Force, Fluid Pressure, Liquid Flow, Liquid Level, Temperature, Light Sensors – Selection of Sensors

UNIT II**ACTUATION SYSTEMS**

Pneumatic and Hydraulic Systems Directional Control Valves Rotary Actuators. Mechanical Actuation Systems – Cams – Gear Trains – Ratchet and pawl – Belt and Chain Drives – Bearings. Electrical Actuation Systems – Mechanical Switches – Solid State Switches – Solenoids – Construction and working principle of DC and AC Motors, speed control of AC and DC drives, Stepper Motors-switching circuitries for stepper motor – AC & DC Servo motors

UNIT III**SYSTEM MODELS AND CONTROLLERS**

Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational Translational Systems, Electromechanical Systems Hydraulic Mechanical Systems. Continuous and discrete process Controllers – Control Mode – Two – Step mode – Proportional Mode – Derivative Mode – Integral Mode – PID Controllers – Digital Controllers – Velocity Control – Adaptive Control – Digital Logic Control – MicroProcessors Control.

UNIT IV**PROGRAMMING LOGIC CONTROLLERS**

Programmable Logic Controllers– Basic Structure – Input / Output Processing – Programming – Mnemonics Timers, Internal relays and counters Shift Registers Master and Jump Controls – DataHandling – Analogs Input / Output – Selection of a PLC.

UNIT V

DESIGN OF MECHATRONICS SYSTEM

Stages in designing Mechatronics Systems Traditional and Mechatronic Design Possible Design Solutions. Case studies of Mechatronics systems Pick and place Robot Autonomous mobile robot-Wireless surveillance balloon- Engine Management system- Automatic car park barrier.

TEXT BOOKS:

1. Bolton,W, "Mechatronics" , Pearson education, second edition, fifth Indian Reprint, 2003
2. Smaili.A and Mrad.F , "Mechatronics integrated technologies for intelligent machines", Oxforduniversity press, 2008

REFERENCES:

1. Rajput. R.K, A textbook of mechatronics, S. Chand & Co, 2007
2. Michael B. Hstand and David G. Alciatore, " Introduction to Mechatronics and Measurement Systems", McGraw-Hill International Editions, 2000.
3. Bradley D. A., Dawson D., Buru N.C. and Loader A.J, "Mechatronics", Chapman and
4. Hall, 1993.
5. Dan Necsulesu, "Mechatronics", Pearson Education Asia, 2002 (Indian Reprint).
6. Lawrence J. Kamm, "Understanding Electro – Mechanical Engineering", An
7. Introduction to Mechatronics, Prentice – Hall of India Pvt., Ltd., 2000.
8. Nitaigour Premchand Mahadik, "Mechatronics", Tata McGraw-Hill publishing
9. Company Ltd, 2003

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B. Tech IV-II Sem. (EIE)

L	T	P	C
3	1	0	3

**15A10804 JAVA PROGRAMMING
(MOOCS-III)**
Course Objective:

- Study the syntax, semantics and features of Java Programming Language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

Course Outcome:

- Ability to solve problems using object oriented approach and implement them using Java
- Ability to write Efficient programs with multitasking ability and handle exceptions
- Create user friendly interface

UNIT I

Introduction to Java: The key attributes of object oriented programming, Simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

UNIT II

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.

Packages – Defining, Finding, Member Access, Importing.

UNIT III

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, Subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

I/O: Byte streams and Classes, Character streams and Classes, Predefined streams, Using byte streams, Reading and Writing files using byte streams, Reading

and writing binary data, Random-access files, File I/O using character streams, Wrappers.

UNIT IV

Multithreading: Fundamentals, Thread class, Runnable interface, Creating multiple threads, Life cycle of thread, Thread priorities, Synchronization, Thread communication, Suspending, Resuming and Stopping threads. **Applets:** Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

Networking: Basics, Networking classes and interfaces, InetAddress, Inet4Address and Inet6Address, TCP/IP Client Sockets, URL, URLConnection, HttpURLConnection, The URI class, Cookies, TCP/IP Server sockets, Datagrams.

UNIT V

Swings: The origin and design philosophy of swing, Components and containers, Layout managers, Event handling, Using a push button, jtextfield, jlabel and image icon, The swing buttons, Trees, An overview of jmenubar, jmenu and jMenuItem, Creating a main menu, Add mnemonics and accelerators to Menu items, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, Create a modeless dialog.

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien,
2. Special Indian Edition, McGrawHill, 2013.
3. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
3. "Core Java", Nageswar Rao, Wiley Publishers.
4. "Thinking in Java", Bruce Eckel, Pearson Education.
5. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
6. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
7. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
8. "Java in Nutshell", David Flanagan, O'Reilly
9. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press.