



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

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

**ELECTRICAL AND ELECTRONICS ENGINEERING**

**B.Tech. I Year**

Sl.No	Course code	Subject	Th	Tu/	Lab	Credits
1.	13A52101	Communicative English	2	-	-	3
2.	13A56101	Engineering Physics	2	-	-	3
3.	13A51101	Engineering Chemistry	2	-	-	3
4.	13A54101	Mathematics – I	3	1	-	5
5.	13A12101	Programming in C & Data Structures	3	1	-	5
6.	13A54102	Mathematics - II	3	1	-	5
7.	13A02101	Electrical Circuits	3	1	-	5
8.	13A12102	Programming in C & Data Structures Lab		-	3	4
9.	13A99102	Engineering Physics and Engineering Chemistry Lab *		-	3	4
10.	13A99103	Engineering & I.T. Workshop #		-	3	4
11.	13A52102	English Language Communication Skills Lab		-	3	4
Total Credits						45

Th = Theory; Tu = Tutorial & Lab = Laboratory

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

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

**B.Tech. II - I Semester**

S.No	Course code	Subject	Theory	Tu / Drg / Lab	Credits
1.	13A54302	Mathematics - III	3	1 - -	3
2.	13A01403	Environmental Science	3	1 - -	3
3.	13A01307	Fluid Mechanics and Hydraulic Machinery	3	1 - -	3
4.	13A04301	Electronic Devices and circuits	3	1 - -	3
5.	13A03304	Engineering Graphics	1	- 3 -	3
6.	13A02301	Electrical Machines –I	3	1 - -	3
7.	13A01406	Fluid Mechanics and Hydraulic Machinery lab	-	- - 3	2
8.	13A02302	Electric circuits and Simulation lab	-	- - 3	2
Total Credits					22

**B.Tech. II - II Semester**

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A02401	Electromagnetic Fields	3	1 -	3
2.	13A02402	Control Systems Engineering	3	1 -	3
3.	13A04407	Analog Electronic Circuits	3	1 -	3
4.	13A04303	Switching Theory and logic design	3	1 -	3
5.	13A02403	Electrical Power Generating Systems	3	1 -	3
6.	13A02404	Electrical Machines –II	3	1 -	3
7.	13A02405	Electrical Machines Lab -I	-	- 3	2
8.	13A04305	Electronic Devices & Circuits lab	-	- 3	2
Total Credits					22

**B.Tech. III - I Semester**

S.No.	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A52501	Managerial Economics and Financial Analysis	3	1 -	3
2.	13A02501	Electrical & Electronic Measuring Instruments	3	1 -	3
3.	13A04508	Linear & Digital IC Applications	3	1 -	3
4.	13A02502	Electrical Power Transmission Systems	3	1 -	3
5.	13A02503	Power Electronics	3	1 -	3
6.	13A02504	Electrical Machines – III	3	1 -	3
7.	13A02505	Electrical Machines Lab – II	-	- 3	2
8.	13A02506	Control Systems and Simulation Lab	-	- 3	2
9.	13A52301	Human Values & Professional Ethics (Audit course)	2	- -	-
Total Credits					22

**B.Tech. III - II Semester**

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A52601	Management Science	3	1 -	3
2.	13A02601	Power Semiconductor Drives	3	1 -	3
3.	13A02602	Power System Protection	3	1 -	3
4.	13A04601	Microprocessors and Microcontrollers	3	1 -	3
5.	13A02603	Power System Operation and Control	3	1 -	3
6.	13A02604	Power System Analysis	3	1 -	3
7.	13A02605	Power Systems and Simulation Lab	-	- 3	2
8.	13A02606	Electrical Measurements Lab	-	- 3	2
9.	13A52502	Advanced English Language Communication Skills Lab (Audit course)	-	- 3	-
Total Credits					22

**B.Tech. IV - I Semester**

S.No	Course code	Subject	Theory	Tu / Lab		Credits
1.	13A02701	Electrical Distribution Systems	3	1	-	3
2.	13A02702	Digital Signal Processing	3	1	-	3
3.	13A02703	HVDC Transmission	3	1	-	3
4.	13A02704	Flexible AC Transmission Systems	3	1	-	3
5.		<b>Elective – I</b> (Open Elective)	3	1	-	3
6.	13A02705	<b>Elective – II</b> Instrumentation	3	1	-	3
	13A02706	Design of Electrical Systems				
	13A04712	Communication Systems				
	13A02707	AI Applications to Electrical Systems				
7.	13A04605	Microprocessors and microcontrollers lab	-	-	3	2
8.	13A02708	Power Electronics and Simulation Lab	-	-	3	2
Total Credits						22

**B.Tech. IV - II Semester**

S.No.	Course code	Subject	Theory	Tu / Lab		Credits
1.	13A02801	Power Quality	3	1	-	3
2.	13A02802	Utilization Of Electrical Energy	3	1	-	3
3.		<b>ELECTIVE – III</b>	3	1	-	3
	13A02803	Modern Control Theory				
	13A02804	Special Electro Mechanical Systems				
	13A02805	Power System Deregulation				
4.		<b>ELECTIVE – IV</b>	3	1	-	3
	13A02807	Reliability Engineering & Applications to Power Systems				
	13A02808	High Voltage Engineering				
	13A02809	Smart Grid				
5.	13A02810	Energy Auditing & Demand Side Management	-	-	-	3
	13A02811	Seminar & Comprehensive viva voce				
6.	13A02812	Project	-	-	-	10
Total Credits						25

**Common to All Branches**  
**(13A52101) COMMUNICATIVE ENGLISH**

**Preamble:**

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

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

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

**Course Objective:**

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

**Learning Outcome:**

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

**UNIT I**

**Chapter entitled 'Humour' from "Using English"**

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

Listening - Techniques - Importance of phonetics

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

R- Reading Strategies -Skimming and Scanning

W- Writing strategies- sentence structures

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

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

**UNIT II**

**Chapter entitled 'Inspiration' from "Using English"**

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

L- Listening to details

S- Apologizing, Interrupting, Requesting and Making polite conversations

R- Note making strategies  
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices  
G-Auxiliary verbs and question tags  
V- synonyms-antonyms, homonyms, homophones, homographs, words often confused

### **UNIT III**

**Chapter entitled ‘Sustainable Development’ from “Using English”**

**Chapter entitled ‘Short Story - (The Happy Prince)’ from “New Horizons”**

L- Listening to themes and note taking

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

R- Reading for details -1

W- Resume and cover letter

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

V-Word formation and One-Word Substitutes

### **UNIT IV**

**Chapter entitled ‘Relationships’ from “Using English”**

**Chapter entitled ‘Poem - (IF by Rudyard Kipling)’ from “New Horizons”**

L- Listening to news

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

R- Reading for specific details and Information

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

G- Voice and Subject–Verb Agreement

V- Idioms and prepositional Phrases

### **UNIT V**

**Chapter entitled ‘Science and Humanism’ from “Using English”**

**Chapter entitled ‘Autobiography - (My Struggle for an Education by Booker T.Washington)’ from “New Horizons”**

L- Listening to speeches

S- Making Presentations and Group Discussions

R- Reading for Information

W- E-mail drafting

G- Conditional clauses and conjunctions

V- Collocations and Technical Vocabulary and using words appropriately

#### **Text Books:**

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

#### **Reference Books:**

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

**(13A56101) ENGINEERING PHYSICS**

**Preamble:**

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

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

**Course Objective:**

- To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.*
- To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and also to understand different types of defects in crystals 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 on semiconductor based electronic devices, basic concepts and applications of semiconductor and magnetic materials have been introduced which find potential in the emerging micro device applications.*
- To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in modern emerging technologies are elicited.*

**Learning Outcome:**

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

- *The electronic and magnetic properties of materials were successfully explained by free electron theory and focused on the basis for the band theory.*
- *The properties and device applications of semiconducting and magnetic materials are illustrated.*
- *The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.*

## UNIT I

### PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

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

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

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

## UNIT II

### CRYSTALLOGRAPHY AND ULTRASONICS:

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

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

## UNIT III

### QUANTUM MECHANICS AND FREE ELECTRON THEORY:

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

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

## UNIT IV

### SEMICONDUCTORS AND MAGNETIC MATERIALS:

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

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



## UNIT V

### **SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS:**

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

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

#### **Text Books:**

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

#### **Reference Books:**

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

**(13A51101) ENGINEERING CHEMISTRY**

**Preamble:**

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

**Course Objective:**

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

**Learning Outcome:**

The student is expected to:

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

**UNIT I**

**ELECTROCHEMISTRY:**

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

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

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

## UNIT II

### POLYMERS:

Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordination covalent, Elastomers (rubbers), Natural Rubber, Compounding of Rubber, Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethane, Polysulfide (Thiokol) rubbers. Plastics: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications, PVC, Bakelite, nylons.

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

**Inorganic Polymers:** Basic Introduction, Silicones, Polyphosphazenes ( $-(R)_2P=N-$ ) applications.

## UNIT III

### FUEL TECHNOLOGY:

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

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

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

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

## UNIT IV

### CHEMISTRY OF ENGINEERING MATERIALS:

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

## UNIT V

### WATER TREATMENT:

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

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

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

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

### Text Books:

1. *Engineering Chemistry* by K.N. Jayaveera, G.V. Subba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Fourth Edition, 2012.
2. *A Text book of Engineering Chemistry* by S.S. Dhara, S.S. Umare, S. Chand Publications, New Delhi, 12<sup>th</sup> Edition, 2010.

### Reference Books:

1. *A Text Book of Engineering Chemistry*, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15<sup>th</sup> Edition, 2010.
2. *Engineering Chemistry* by K.B. Chandra Sekhar, U.N. Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2<sup>nd</sup> Edition, 2012.

3. *Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.*
4. *Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu, BS Publications, Hyderabad, 3<sup>rd</sup> Edition, 2008.*
5. *Text Book of Engineering Chemistry, Shashichawla, Dhanapath Rai Publications, New Delhi, 4<sup>th</sup> Edition, 2011.*
6. *Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.*

MRUUA

B.Tech. I Year

Th	Tu	C
3	1	5

Common to All Branches

**(13A54101) MATHEMATICS – I**

**Course Objective:**

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

**Learning Outcome:**

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

**UNIT I**

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

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

**UNIT II**

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

**UNIT III**

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

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

**UNIT IV**

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

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

**UNIT V**

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

**Text Books:**

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

**Reference Books:**

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

B.Tech. I Year

Th	Tu	C
3	1	5

(13A12101) PROGRAMMING IN C & DATA STRUCTURES

**Course Objective:**

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

**Learning Outcome:**

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

**UNIT I**

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

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

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

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

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

**UNIT II**

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

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

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

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

### UNIT III

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

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

**Array Techniques:** Array order reversal, Removal of duplicates from an ordered array, Finding the K<sup>th</sup> smallest element.

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

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

### UNIT IV

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

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

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

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

### UNIT V

**Introduction to Data Structures:** Data abstraction

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

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

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

#### **Text Books:**

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

#### **Reference Books:**

1. *"Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education*
2. *"Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.*
3. *"Programming in C", Reema Thareja, Oxford Higher Education.*



4. *“Computer Fundamentals and C Programming”, First Edition, Dr.P.Chenna Reddy, Available at: [www.pothi.com](http://www.pothi.com).*
5. *“Data Structure and Program Design in C”, Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.*
6. *“Programming with C”, R.S. Bichkar, University Press.*
7. *“Computer Science A Structured Programming Approach Using C”, Third Edition, Fourouzan & Gilberg, Cengage Learning.*

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(13A54102) MATHEMATICS – II

**Course Objective:**

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

**Learning Outcome:**

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

**UNIT I**

Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonalization of matrix. Calculation of powers of matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

**UNIT II**

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

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

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

**UNIT III**

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

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

**UNIT IV**

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

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

## UNIT V

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

### **Text Books:**

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

### **Reference Books:**

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

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(13A02101) ELECTRICAL CIRCUITS

**Course Objective:**

*This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Circuit concepts, magnetic circuits, theorems, transient analysis and network topology etc.*

**UNIT I**

**INTRODUCTION TO ELECTRICAL & MAGNETIC CIRCUITS:**

**Electrical Circuits:** Circuit Concept–R-L-C Parameters-Voltage and Current Sources- Independent and Dependent Sources-Source Transformation-Voltage - Current Relationship for Passive Elements (For Different Input Signals-Square, Ramp, Saw Tooth, Triangular). Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. Examples

**Magnetic Circuits:** Faraday's Laws of Electromagnetic Induction-Concept of Self and Mutual Inductance-Dot Convention-Coefficient of Coupling-Composite Magnetic Circuit-Analysis of Series and Parallel Magnetic Circuits, MMF Calculations

**UNIT II**

**SINGLE PHASE AND THREE PHASE A.C CIRCUITS:**

**Single Phase Circuits:** R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference – Complex and Polar Forms of Representations, J-Notation, Steady State Analysis of R, L and C (In Series, Parallel and Series Parallel Combinations) With Sinusoidal Excitation- Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex Power. Examples.

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

**UNIT III**

**LOCUS DIAGRAMS & NETWORK TOPOLOGY:**

**Locus Diagrams:** Series R-L, R-C, R-L-C and Parallel Combination with Variation of Various Parameters - Resonance-Series, Parallel Circuits, Concept of Band Width and Q Factor.

**Network Topology:** Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks – Loop and Nodal Methods of Analysis of Networks with Dependent & Independent Voltage and Current Sources – Duality & Dual Networks. Nodal Analysis, Mesh Analysis, Super Node and Super Mesh for D.C Excitations.

**UNIT IV**

**NETWORK THEOREMS & TWO PORT NETWORKS:**

**Network Theorems:** Thevenin's, Norton's, Maximum Power Transfer and Millman's Theorems for D.C and Sinusoidal Excitations. Tellegen's, Superposition, Reciprocity and Compensation Theorems for D.C And Sinusoidal Excitations.

**Two Port Networks:** Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations. Concept of Transformed Network - Two Port Network Parameters Using Transformed Variables.

## **UNIT V**

### **TRANSIENT ANALYSIS & FOURIER TRANSFORMS:**

**D.C Transient Analysis:** Transient Response of R-L, R-C, R-L-C Series Circuits for D.C Excitation-Initial Conditions-Solution Method Using Differential Equation and Laplace Transforms, Response of R-L & R-C Networks to Pulse Excitation.

**A.C Transient Analysis:** Transient Response of R-L, R-C, R-L-C Series Circuits for Sinusoidal Excitations-Initial Conditions-Solution Method Using Differential Equations and Laplace Transforms

**Fourier Transforms:** Fourier Theorem- Trigonometric Form and Exponential Form of Fourier Series – Conditions of Symmetry- Line Spectra and Phase Angle Spectra- Analysis of Electrical Circuits to Non Sinusoidal Periodic Waveforms. Fourier Integrals and Fourier Transforms – Properties of Fourier Transforms and Application to Electrical Circuits. Introduction to P-Spice

#### **Text Books:**

1. *Network Analysis* by M.E Van Valkenburg, Prentice Hall (India), 3<sup>rd</sup> Edition, 2012.
2. *Circuit Theory (Analysis & Synthesis)* by A. Chakrabarti, Dhanpat Rai & Sons, 2010.
3. *Electric Circuits- Schuam Series*, 2012.

#### **Reference Books:**

1. *Circuits & Networks* by A. Sudhakar and Shyammohan S Palli, Tata McGraw- Hill, 2010.
2. *Electric Circuits* by N.Sreenivasulu, REEM Publications, 2013.
3. *Engineering circuit analysis* by William Hayt and Jack E. Kemmerly, Mc Graw Hill Company, 6<sup>th</sup> edition, 2005.
4. *Electrical Circuit Theory and Technology* by John Bird, Routledge, Taylor & Fransis, 2007.

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**(13A12102) PROGRAMMING IN C & DATA STRUCTURES LAB**

**Course Objective:**

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

**Learning Outcome:**

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

**LIST OF EXPERIMENTS/TASKS**

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to 'n' terms e  

$$x=1+x+x^2/2!+x^3/3!+x^4/4!+-----$$
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.
  - i. Find the sum of Diagonal Elements of a matrix.
  - ii. Print Transpose of a matrix.
  - iii. Print sum of even and odd numbers in a given matrix.
19. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.

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

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

**References:**

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



**Common to All Branches**

**(13A99102) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB**

**ENGINEERING PHYSICS LAB**

**LIST OF EXPERIMENTS**

**Any 10 of the following experiments has to be performed:**

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

**ENGINEERING CHEMISTRY LAB**

**Preamble:**

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

**Course Objective:**

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

**Learning Outcome:**

- *Would be confident in handling energy storage systems and would be able combat chemical corrosion*
- *Would have acquired the practical skill to handle the analytical methods with confidence.*
- *Would feel comfortable to think of design materials with the requisite properties*
- *Would be in a position to technically address the water related problems.*

**LIST OF EXPERIMENTS**

**Any 10 of the following experiments has to be performed:**

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

**References:**

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

**(13A99103) ENGINEERING & I.T. WORKSHOP**

**ENGINEERING WORKSHOP**

**Course Objective:**

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

**1. TRADES FOR EXERCISES:**

- 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
- 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
- Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
- 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.
- Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
- Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

**2. TRADES FOR DEMONSTRATION:**

- Plumbing
- Machine Shop
- 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:**

- Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009*
- Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.*
- Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e Vikas*
- 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
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MINU

**Common to All Branches**  
**(13A52102) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB**

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

**Course Objective:**

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

**Learning Outcome:**

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

**PHONETICS**

Importance of speaking phonetically correct English

Speech mechanism-Organs of speech

Uttering letters-Production of vowels sounds

Uttering letters -Production of consonant sounds

Uttering words-Stress on words and stress rules

Uttering sentences-Intonation-tone group

**LISTENING**

Listening as a skill

Listening activities

**PRESENTATIONAL SKILLS**

Preparation

Prepared speech

Impromptu speech

topic originaive techniques

JAM (Just A Minute)

Describing people/object/place

Presentation-

Stage dynamics

Body language

**SPEAKING SKILLS**

Telephone skills

Role plays

Public Speaking

## GROUP ACTIVITIES

Debates

Situational dialogues

## MINIMUM REQUIREMENT FOR ELCS LAB:

The English Language Lab shall have two parts:

### Computer Assisted Language Learning (CALL) Lab:

- The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

### System Requirement (Hardware component):

- Computer network with LAN with minimum 60 multimedia systems with the following specifications:
  - P – IV Processor
  - Speed – 2.8 GHZ
  - RAM – 512 MB Minimum
  - Hard Disk – 80 GB
  - Headphones of High quality

### SUGGESTED SOFTWARE:

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