R V R & J C COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-19

(Autonomous) (w.e.f. the academic year 2018-2019)

B.Tech., Computer Science & Engineering

Semester I (First Year)

S.No.	CODE.NO	SUBJECT	SCHEME OF INSTRUCTION PERIODS PER WEEK			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 111	Mathematics – I	3	1	-	40	60	4	BS
2	CS/IT 112	Engineering Physics	3	1	-	40	60	4	BS
3	CS/IT/EC 113	Basic Electrical Engineering	3	1	-	40	60	4	ES
4	CS/IT 151	Physics Lab	-	-	3	40	60	1.5	BS
5	CS/IT/EC 152	Basic Electrical Engineering Lab	-	-	2	40	60	1	ES
6	CS/IT/CH/EC 153	Engineering Graphics and Design Lab	1	-	4	40	60	3	ES
7	MC 000	Three Weeks Orientation Program	--	--	--	--	--	--	--
8	MC 001	Constitution of India	2	-	-	100	-	-	MC
9	CS V01	English Competency Development Program	2	-	-	100	-	-	VC
10.	CS V02	Introduction to Computing	2	-	2	100	-	-	VC
Total			16	3	11	540	360	17.5	TPW-30

Semester II (First Year)

S.No.	CODE.NO	SUBJECT	Scheme of Instruction periods per week			Scheme of examination			Category Code
			L	T	P	INT	EXT	CREDITS	
1	CS/IT 121	Mathematics – II	3	1	-	40	60	4	BS
2	CS/CE/IT 122	Engineering Chemistry	3	1	-	40	60	4	BS
3	CS/CE/CH/IT/EE/EC/ME 123	Programming for Problem Solving	3	-	-	40	60	3	ES
4	CS/CH/IT/EC 124	English for Communication Skills	2	-	-	40	60	2	HS
5	CS/CE/IT 161	Chemistry Lab	-	-	3	40	60	1.5	BS
6	CS/CE/CH/IT/EE/EC/ME 162	Programming for Problem Solving Lab	-	-	4	40	60	2	ES
7	CS/IT/CH/EC 163	Workshop Practice Lab	1	-	4	40	60	3	ES
8	CS/CH/IT/EC 164	English Language Communication Skills Lab	-	-	2	40	60	1	HS
9	MC 002	Environmental Science	2	-	-	100	-	-	MC
10	MC 003	Essence of Indian Traditional Knowledge	2	-	-	100	-	-	MC
Total			16	2	13	520	480	20.5	TPW-31

Semester I (First year)

CS/IT 111	Mathematics-I	L	T	P	C
		3	1	0	4

Course Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more a level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes:

The students will able to:

1. Evaluate certain improper integrals apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. Know fallouts of Role's theorem that is fundamental to application of analysis to Engineering problems.
3. Understand linear algebra including linear transformations in a comprehensive manner.
4. Find matrix Eigen values and know diagonalization and orthogonalization.

Course Content:

UNIT I Text Book-1 15 Periods

Evolutes and Involutes, Evaluation of improper integrals: Integrals without infinite limits of integration, Beta function, Gamma function, Relation between beta and gammafunctions (without proof) Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT II Text Book-1 15 Periods

Rolle's theorem(without proof), Lagrange's mean value theorem(without proof), Taylor's and Maclaurin series, Sequences, Series, Series of positive terms, Convergence tests: Comparisontest(limit form) D'Alembert's ratio test, Raabe's test for convergence.

UNIT III Text Book-2 15 Periods

Vectors: addition and scalar multiplication, linear dependence and independence of vectors.
Vector space, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

UNIT IV Text Book-2 15 Periods

Characteristic equation, Eigen values and eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, Eigenbasis, Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Learning Resources:

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd edition.
2. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson, 2002.
2. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
3. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2006.

CS/IT 112	Engineering Physics	L	T	P	C
		3	1	0	4

Course Objectives:

1. Introducing the concept of electron motion in periodic potentials and classification of solids, band formation by learning the prerequisite quantum physics.
2. Explaining the diode equation and formation of P-N junction from the basics of semiconductors.
3. Understanding the interaction of radiation with bulk semiconductors and the relevant Optoelectronic devices with energy band diagrams.
4. Exploring the applications of devices in low dimensional materials by understanding the density of states and experimental techniques to be used for measurement of transport properties.

Course Outcomes:

After successful completion of the course, the student will be able to understand:

1. Necessity of periodical potentials and conditions for explaining the properties and band formation with the help of quantum physics.
2. The theory of P-N junction diode from the basics of semiconductor concepts.
3. The theory and application of Optoelectronic devices.
4. Measurement techniques employed in transport phenomena and variation of properties in low dimensions.

Course Content:

UNIT I 15 Periods

Introduction to Quantum mechanics: Wave nature of particles, deBroglie hypothesis, Davission – Germer experiment, Time dependent and Time independent Schrodinger wave equations, Physical significance of wave function, Uncertainty principle, Single slit experiment. Solution to stationary state problem: particle in a box, and extension to 3-D box (qualitative treatment only).

Electronic Theory of materials: Salient features of Free electronic theory, Fermi – Dirac distribution function, Fermi level, Density of States, Bloch wave function, Kronig-Penney model, E-K curves, Brillouin zones, Effective mass, Degree of freedom of electron - Distinction of metals and insulators. Concept of hole, Energy band formation in solids.

UNIT II 15 Periods

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier- concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, drift and diffusion equations, Einstien's relation, p-n junction formation, diode equation,Hall effect and applications.

UNIT III 15 Periods

Direct and Indirect band gap semiconductors, Light-semiconductor interaction: Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission, Optical loss and gain; Density of states for photons, Semiconducting laser, Homo and Hetro structure lasers with band diagrams, characteristics of laser and LED, PIN diode, Solar cell, working principle and characteristics.

UNIT IV 15 Periods

Density of states in 2D, 1D and 0D (qualitatively), Practical examples of low-dimensional systems such as quantum wells, wires, and dots. Four-point probe and vanderPauw measurements for carrier density, resistivity, and Hallmobility, Hot-point probe measurement, capacitance-voltage measurements, Parameter extraction from Diode I-V characteristics.

Learning Resources:

Text Book:

1. M.N. Avadhanulu, P.G. Kshirasagar - A Text Book of Engineering Physics, S. Chand & Company Ltd.2018

Reference Books:

1. Donald A.Neeman - Semiconductor Physics and Devices : Basic Principle (Fourth edition), TMH, 2012.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
3. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
4. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
5. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications,Oxford University Press, New York (2007).
6. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).

Web References:

1. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL.
2. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL.

CS/IT/EC 113	Basic Electrical Engineering	L	T	P	C
		3	1	0	4

Course Objectives:

The main objectives of this course are

1. To introduce fundamental laws, basic electrical elements, sources and their characteristics.
2. To develop the ability to apply circuit analysis to AC circuits
3. To provide students with fundamental concepts on the construction and operation of transformers and electrical machines.

Course Outcomes:

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

1. Understand the basic electrical circuits and batteries.
2. Gain the knowledge on the concept of AC circuits.
3. Get the knowledge on the principle and operation of single phase transformer
4. Understand the operation of electrical machines.

Course Content:

UNIT I 15 Periods

DC Circuits:
Batteries: Lead-acid, Nickel-iron, Nickel-Cadmium batteries (Operation only). Elementary calculations for energy consumption.
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

UNIT II 15 Periods

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

UNIT III 15 Periods

Transformers:
Magnetic materials, BH characteristics, working principle of single phase transformer, ideal and practical transformer, equivalent circuit form O.C and |S.C tests. Losses in transformers, regulation and efficiency. Auto-transformer-Working principle, comparison with two winding transformer.

UNIT IV 15 Periods

Electrical Machines:
Construction, working principle of DC generator and motor(Elementary treatment only), torque-speed characteristic of separately excited dc motor. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency. Construction and working of synchronous generators.

Learning Resources:

Text Books:

1. T.K.Nagasarkar and M.S.Sukhija – Principles of Basic Electrical Engineering, Oxford University Press, 2018.
2. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill,2010.

Reference Books:

1. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press,2011.
3. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
4. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
5. J.B Gupta ,Basic Electrical Engineering, S.K.Kataria & Sons, 6th Edition 2015

Web References:

1. http://www.egate.ws/
2. http://cosmolearning.org/courses/circuit-theory/
3. http://www.nptelvideos.in/2012/11/circuit-theory.html
4. http://elearning.vtu.ac.in/P9/notes/06ES34/Unit1-KCV.pdf
5. http://pbtstudies.blogspot.in/

CS/IT 151	Physics Lab	L	T	P	C
		0	0	3	1.5

Course Objectives:

The aim and objective of the Lab course on Physics is to introduce the students of B.Tech. class to the formal structure of Physics so that they can use these in Engineering as per their requirement.

Course Outcomes:

At the end of the course, the student will be:
1. Able to use CRO, Function generator, Spectrometer for making measurements.
2. Able to test the optical instruments using principles of interference and diffraction.
3. Able to understand the concepts learned in the Physics theory.
4. Trained in carrying out precise measurements and handling sensitive equipment.
5. Learn to draw conclusions from data and develop skills in experimental design

(Any 10 out of the following experiments)

1. Measurements using Vernier Calipers, Screw Gauge and Spherometer
2. Newton's rings - Measurement of radius of curvature of plano-convex lens
3. Determination of Energy band gap of a Semiconductor
4. Optical fibers – Determination of Numerical Aperture
5. Diffraction grating - Measurement of wavelengthsusing Spectrometer
6. Magnetic field in Helmholtz coil
7. PhotoVoltaic Cell – Determination of fill factor
8. Series LCR resonance circuit –Determination of Q - factor
9. Four probe method apparatus for measurements of resistivity and conductivity
10. Determination of wavelengths using diffraction grating
11. Variation of magnetic field along the axis of a circular current carrying coil
12. Carey Foster's bridge – Determination of Specific Resistance

Reference Book:

Physics Lab Manual: RVR & JCCE, Guntur

Note: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS/IT/EC 152	Basic Electrical Engineering Laboratory	L	T	P	C
		0	0	2	1

Course Objectives:

The main objectives of this lab course are

1. To conduct experiments on electrical circuits.
2. To design experimental setups for theorems.
3. To know the response of electrical circuits for different excitations

Course Outcomes:

Upon completion of this laboratory, the student will be able to:

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of resonance.
5. Verify the network theorems.

List of experiments/demonstrations:

1. Familiarization of Electrical Installations and Electrical Testing Equipment: Miniature circuit breakers (MCBs), Moulded Case Circuit Breakers (MCCBs), Earth-leakage circuit breakers (**ELCBs**), Fuses, Types of Wires, Wire Gauges, continuity test, megger, Cables and Earthing.
2. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, wattmeter, multi-meter, oscilloscope, measurement of basic parameters.
3. Verification of KVL& KCL.
4. Verification of Superposition Theorem.
5. Verification of Thevenin's Theorem.
6. Verification of Norton's Theorem.
7. Transformers: Observation of the no-load current waveform on an oscilloscope (non sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).
8. OC & SC tests on single phase transformer.
9. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
10. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement).
11. Swinburne's test on dc motor.
12. Speed control of dc motor.
13. Experiments on three-phase induction motors. Direction reversal by change of phase-sequence connections, Torque-Slip Characteristics of an induction motor.
14. Synchronous Machine operating as a generator: stand-alone operation with a load, control of voltage through field excitation.
15. Determination of choke coil parameters.

Note: A minimum of 10(Ten) experiments have to be Performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

CS/IT/CH/EC 153	Engineering Graphics & Design Lab	L	T	P	C
		1	0	4	3

Course Objectives:

The course will enable the students to

1. Expose the students to standards and conventions followed in preparation of engineering drawings.
2. Make them understand the concepts of orthographic and isometric projections
3. Develop the ability of conveying the engineering information through drawings.
4. Make them understand the relevance of engineering drawing to different engineering domains.
5. Develop the ability of producing engineering drawings using drawing instruments.
6. Enable them to use computer aided drafting packages for the generation of drawings.

Course Outcomes:

Upon completion of this course, students will be able to

1. Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
2. Produce computer generated drawings using CAD software.
3. Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.
4. Develop isometric drawings of simple objects reading the orthographic projections of those objects.
5. Convert pictorial and isometric views of simple objects to orthographic views.

(**UNIT I to IV** shall be taught in conventional drawing method and Unit V shall be taught with the aid of computer)

UNITI

General: Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering.

Conic sections: Construction of Ellipse, Parabola, Hyperbola and Rectangular Hyperbola. (General method only)

Curves: Cycloid, Epicycloid, Hypocycloid and Involute; and **Scales**

UNIT II

Method of Projections: Principles of projection - First angle and third angle projection of points, Projection of straight lines inclined to both planes. Traces of lines.

Projections of planes: Projections of planes inclined to both the planes, projections on auxiliary planes.

UNIT III

Projections of Regular Solids: Projections of solids (Prism, Pyramid, Cylinder and Cone) with varying positions.

Sections of Solids: Sections of Prisms, Pyramids, cylinders and Cones. True shapes of sections. (Limited to the cutting plane perpendicular to one of the principal plane).

Development of surfaces: Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT IV

Isometric Projections: Principles of Isometric projection-Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids

Orthographic Projections: Conversion of pictorial views into Orthographic views and Vice-versa. (Treatment is limited to simple castings).

Perspective Projections: Introduction to Perspective Projection

UNIT V

Over view of Computer Aided drafting (AutoCAD): Introduction, starting and customizing AutoCAD screen, usage of different menus, toolbars(drawing, editing, dimension, text, object properties..etc), tabs (Object, snap, grid, polar, ortho, otrack..etc) and command prompt. Setting units, limits, layers and viewports (Isometric, Top, Front, back..etc). 2D drawings of various mechanical and structural components, electrical and electronic circuits. Orthographic and Isometric views of mechanical castings and simple structures.

Learning Resources:

Text Book:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.

Reference Books:

1. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
3. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
4. (Corresponding set of) CAD Software Theory and User Manuals

MC 001	Constitution of India	L	T	P	C
		2	0	0	0

Course Objective:
To provide basic information about Indian Constitution.

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

1. Understand the significance of many provisions of the Constitution as well as to gain insight into their back ground. They will also understand number of fundamental rights subject to limitations in the light of leading cases.
2. Study guidelines for the State as well as for the Citizens to be followed by the State in the matter of administration as well as in making the laws. It also includes fundamental duties of the Indian Citizens in Part IV A (Article 51A).
3. Understand administration of a State, the doctrine of Separation of Powers.
4. Know how the State is administered at the State level and also the powers and functions of High Court.
5. Understand special provisions relating to Women empowerment and also children. For the stability and security of the Nation, Emergency Provision are Justified.
6. Understand election commission as an independent body with enormous powers and functions to be followed both at the Union and State level. Amendments are necessary, only major few amendments have been included.

Course Content:

UNIT I 10 Periods

Preamble to the Constitution of India Domicile and Citizenship. Fundamental rights under Part III,Leading Cases. Relevance of Directive Principles of State Policy under Part-IV, IV-A Fundamental duties.

UNIT II 10 Periods

Union Executive - President, Vice-President, Prime Minister, Union Legislature - Parliament and Union Judiciary - Supreme Court of India. State Executive - Governors, Chief Minister, State Legislature and High Court.

UNIT III 10 Periods

Special Constitutional Provisions for Scheduled Casters and Tribes, Women and Children and Backward Classes, Emergency Provisions.

UNIT IV 10 Periods

Electoral process, Centre State Relations (Amendment Procedure, 42nd, 44th, 74th, 76th, 86th and 91st Constitutional amendments).

Learning Resources:

Text Book:

1. Durga Das Basu, Introduction to the Constitution of India" (student edition) Prentice - Hall EEE,19th/20th Edition, 2001.

Reference Books:

1. M.V.Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.

2. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI, Learning Pvt.Ltd., New Delhi,2011.

CS V01	English Competency Development Programme	L	T	P	C
		2	0	0	0

Lecture Plan

Session Topic

1. Self Introduction
2. Self Introduction
3. Introducing Others
4. Mind Mapping -Small Talk
5. Random Operation
6. JAM &Extempore
7. Starting a Conversation-Rapid Fire
8. Story Telling
9. Narrating Life Stories
10. Tense Buster
11. Describing people
12. Picture Perception & Description
13. Movie Reviews
14. News Articles-Open Discussion & Debate
15. Everyday Life-Communicative Activities
16. Role Plays
17. Short Versions
18. Contemporary Novels-Critical Appreciation Round

References:

- Contemporary Novels-Critical Appreciation Round.
- eslflow.com/Personality Vocabulary Survey.
- eslflow.com/Celebrity Interview*eslflow.com/Telling stories.
- eslflow.com/ First Impressions/speaking activity.
- Speaking work sheets/Out & About 1 - PHOTOCOPIABLE, Cambridge University Press 2015
- Speaking Unplugged: 30 activities for one-to-one classes by online TEFL training
- Think Teen work book*The guardian weekly/News based English language activities
- Walkietalkiehttps://www.teacherspayteachers.com/Store/Walkietalkie
- AlenMaley's Conversation/Rob Nolasco& Lois Arthur/Oxford University Press
- AlenMaley's Project Work/Diana L.Fried-Booth/Oxford University Press
- Cambridge English/Objective PET/Louise Hashemi& Barbara Thomas
- Cambridge English Business Benchmark/Guy Brook-Hart
- British Council / Learn English Select Face-to-Face Course / APSCHE Communication Skills Project
- Self-Designed Handouts

CS V02	Introduction to Computing	L	T	P	C
		2	0	0	0

Course Objectives:

1. Students will be able to gain in – depth understanding of problem.
2. Students will be able to evaluate different concepts and methods in a computer language.
3. Students will be able to analyze and develop an algorithm for a given problem.
4. Students will be able to apply their knowledge to design and develop Computer solution to real world problems.

Course Outcomes:

1. The student will learn the algorithm and flowchart.
2. The student will learn to formulate fundamental algorithms for logical problems.
3. The student will be able to develop an algorithm using Factoring Methods.
4. The student will be able to design an algorithm using array related problems.

Course Content:

UNIT I 8 Periods

Introduction: Computer & its Components, Algorithm, Characteristics of algorithm, Flowchart, Symbols are used in flowchart.

UNIT II 8 Periods

Fundamentals of Algorithms: Introduction, Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial computation, Sine function computation, Generation of the Fibonacci sequence, Reversing the digits of an integer, Base conversion, Character to number conversion.

UNIT III 8 Periods

Factoring Methods: Introduction, Finding the square root of a number, the smallest divisor of number, the greatest common devisor of two numbers, generating prime numbers, computing the prime factors of an integer, Generation of pseudo-random numbers, raising a number to large power, computing the n^{th} Fibonacci number.

UNIT IV 8 Periods

Array Techniques: Array order reversal, Array counting or histogramming, Finding the maximum number in a set, Removal of duplicates from an ordered array, Partitioning an array.

Learning Resources:

Text Book:

1. R G Dromey, How to Solve it by Computer, PHI. C.A.R.HOARE SERIES EDITOR (Chapters 2 - 4).

Semester II (First year)

CS/IT 121	Mathematics-II	L	T	P	C
		3	1	0	4

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and differential equations. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes:

The students will be able to:
1. Deal with functions of several variables that are essential in most branches of engineering.
2. Evaluate multiple integrals.
3. Understand concepts like divergence, curl and integration of vector function.
4. Solve differential equations which model physical processes.

Course Content:

UNIT I 15 Periods

Multivariable Calculus: Limit, continuity and partial derivatives, total derivative
Maxima, minima and saddle points of two variables, Method of Lagrange multipliers

UNIT II 15 Periods

Multiple Integrals: Double integrals (Cartesian and polar), change of order of integration, change of variables (Cartesian to polar), area by double integration, triple integrals, volume by triple integrals.

UNIT III 15 Periods

Scalar and vector point functions, Gradient, directional derivative, divergence and curl, del applied twice to point and product of point functions (without proofs)Vector integration: line integral, surface and volume integrals, Green's theorem(without proof), Stoke's theorem(without proof), Gauss divergence theorem(without proof)

UNIT IV 15 Periods

First order ordinary differential equations: Linear, Bernouli and exact equations Second order ordinary linear equations: Solution by method of variation of parameters,Cauchy's equation, Power series solutions; Legendre polynomials, Besselfunctions of the first kind and their properties

Learning Resources:

Text Book:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42nd edition.

Reference Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
2. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2006.

CS/CE/IT 122	Engineering Chemistry	L	T	P	C
		3	1	0	4

Course Objectives:

1. It imparts concepts involved in molecular structure and intermolecular forces.
2. Understands the chemistry behind electrochemical energy systems.
3. Students understand the chemical concepts involved in Water treatment and Corrosion.
4. Student shall know about the major organic reactions and end products like conducting polymers.
5. Learn analytical methods useful in characterization of compounds.

Course outcomes:

1. Student can identify stable complexes and suitable electrochemical energy systems for end usage.
2. Student can apply his knowledge for effective water treatment and corrosion prevention.
3. Able to identify chemical reactions that are used in the synthesis of molecules and polymers
4. Distinguish the ranges of the electromagnetic spectrum and characterize a given compound using analytical techniques.

Course Content:

UNIT I 15 Periods

Molecular structure, Intermolecular forces and Energy systems:
Crystal field theory-salient features, energy level diagrams-tetrahedral and octahedral complexes, crystal field stabilization energies and magnetic properties.

Ionic, dipolar, Vander Waal's interaction and Hydrogen bonding, critical phenomena-Andrew's isotherms of CO_2, derivation of critical constants from Vander Waal's equation.
Electrode potential, electrochemical series, Nernst equation and its applications. Batteries-Primary (Dry cell) and secondary (Lead acid), Lithium battery (Li-MnO_2)- advantages, Fuel cell (H_2-O_2 cell).

UNIT II 15 Periods

Water Chemistry and Corrosion:
Water Chemistry-WHO standards, Municipal water treatment-Removal of suspended impurities-Sedimentation, Co-agulation and Filtration-Disinfection of water by chlorine, Break point chlorination, Dechlorination, Purification by ion-exchange method and reverse osmosis.

Corrosion-Introduction, Electrochemical theory of corrosion, galvanic corrosion, differential aeration corrosion, Factors-temperature, pH, overvoltage. Cathodicprotection by sacrificial anodic method and impressed current method. Electroplating (Cu), Electrolessplating (Ni).

UNIT III 15 Periods

Organic Reactions and Polymers:
Types of organic reactions-Substitution (SN_1 and SN_2), Elimination (E_1 and E_2), Addition-Markownikoff's rule and anti-Markownikoff's rule, Cyclisation (Diel's Alder reaction), Synthesis of aspirin.

Polymers-Functionality, Degree of Polymerization, Tacticity-Addition and condensation polymerization, Relationship between Structure and Properties of polymers (Strength, Crystallinity, Elasticity, Plastic Deformation, Glass transition temperature (T_g)), Factors affecting T_g.

Conducting polymers: Introduction, Examples, General applications, Mechanism of conduction in polyacetylene.

UNIT IV 15 Periods

Spectroscopic techniques and its applications:
Beer-Lambert's law, limitations, colorimetric determination of Fe(III)
UV-VIS spectroscopy – electronic transitions, shifts-blue and red, Block diagram - brief introduction of components, Applications – purity and differentiation of conjugated and non-conjugated dienes.

IR Spectroscopy–condition to be IR active, vibrational modes of–AB_2, Block diagram-brief introduction of components, IR spectrum of CO_2 and H_2O molecules, General applications. Fluorescence and its applications in medicine.

Learning Resources:

Text Books:

1. Engineering chemistry, P.C.Jain and Monica Jain, 16th edition, Dhanpat Rai Publishing Company.
2. Wiley Engineering chemistry, 2nd edition, Wiley India Private Limited.

Reference Books:

1. University Chemistry, Bruce H. Mahan, 3rd edition, Narosa Publishing House.
2. A text book of Engineering chemistry, Shashi Chawla, 3rd edition, Dhanpat Rai Publishing Company.

Web References:

1. Engineering Chemistry (NPTEL Web Book by B.L. Tembe, Kamaluddin & M.S. Krishnan).
2. http://www.powerstream.com/BatteryFAQ.html#lec.
3. http://freevideolectures.com/Course/3029/Modern-Instrumental-Methods-ofAnalysis.

CS/IT/CE/CH/EC /EE/ME 123	Programming for Problem Solving	L	T	P	C
		3	0	0	3

Course Objectives:

1. To know the basic problem solving process using Flow Charts and algorithms.
2. To understand the basic concepts of control structures in C.
3. To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. To use the concepts of structures, unions, files and command line arguments in C.

Course Outcomes:

1. Develop algorithm and flowchart for simple problems.
2. Use suitable control structures and arrays for developing code in C.
3. Design modular structured programs using functions and recursion.
4. Develop code for complex applications using structures, pointers and file handling features.

Course Content:

UNIT I 12 Periods

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

Idea of Algorithm: Steps to solve logical and numerical problems, Representation of Algorithm: Flowchart/Pseudocode with examples, from algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code**,** Arithmetic expressions and precedence.

UNIT II 12 Periods

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching, Iteration and loops.
Arrays: Arrays (1-D, 2-D), Character arrays and Strings.
Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations.

UNIT III 12 Periods

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference
Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series.

UNIT IV 12 Periods

Structure: Structures, Defining structures and Array of Structures
Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures.
File handling: Defining and opening a file, closing a file, input/output operations on files using file handling functions, random access to files.

Learning Resources:

Text Book:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Programming in C by Stephen G. Kochan, Fourth Edition, Pearson
3. C Complete Reference, Herbert Sheildt, TMH., 2000.
4. Programming with C by K R Venugopal & Sudeep R Prasad, TMH., 1997.

Web References:

1. http://cprogramminglanguage.net/.
2. http://lectures-c.blogspot.com/.
3. http://www.coronadoenterprises.com/tutorials/c/c_intro.htm.
4. http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf.

CS/IT/CH/EC 124	English for Communication Skills	L	T	P	C
		2	0	0	2

Course Objectives:

1. To enable students improve their lexical and communicative competence and to equip students with oral and written communication skills. To help students understand and learn the correct usage and application of Grammar principles.
2. To get them acquainted with the features of successful professional communication. To enable students acquire various specific features of effective written communication.

Course Outcomes:

At the end of the course, the student will be able to:
1. Use vocabulary contextually.
2. Compose effectively the various forms of professional communication.
3. Apply grammar rules efficiently in spoken and written forms.

Course Content:

UNIT I 10 Periods

Vocabulary Building
- **1.1 -** Root words from foreign languages and their use in English.
- **1.2 -** Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
- **1.3 -** Synonyms, antonyms, and standard abbreviations**.**
- **1.4 -** One word substitutes.

UNIT II 10 Periods

Writing Skills
- **2.1-** Proposal writing.
- **2.2**- Letter-writing.
- **2.3-** Techniques for writing precisely (précis writing).
- **2.4-** E-mail writing.

UNIT III 10 Periods

Identifying Common Errors in Writing
- **3.1-** Subject-verb agreement.
- **3.2-** Noun-pronoun agreement.
- **3.3-** Articles.
- **3.4-** Prepositions.
- **3.5-** Tenses.
- **3.6-** Redundancies.

UNIT IV 10 Periods

Nature and Style of sensible Writing

4.1- Describing
4.2- Narration
4.3- Classifying
4.4- Coherence and cohesion in paragraph writing

Learning Resources:

Text Book:

1. Communication Skills. Sanjay Kumar and Pushpa Lata, Oxford University Press.

Reference Books:

1. Remedial English Grammar. F.T. Wood. macmillan.2007
2. On Writing Well. William Zinsser. Harper Resource Book. 2001
3. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.2006.
4. Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University.
5. Practical English Usage. Michael Swan. OUP. 1995Press

CS/IT/CE 161	Chemistry Lab	L	T	P	C
		0	0	3	1.5

Course Objectives:

1. To learn concepts of equivalent weight, molecular weight, normality, molarity, weight and volume percent.
2. To know the methods of determining hardness and chloride ion content of water sample.
3. To learn the redox methods to determine Fe^{2+} ions present in solution.
4. To know principles and methods involved in using instruments like conductivity bridge and potentiometer
5. To know the molecular properties like surface tension, viscosity.
6. To know synthetic methods for preparation of drugs and polymer

Course outcomes:

1. Estimate the Fe(II) content of a given solution and chloride/hardness content of water.
2. Measure molecular properties such as surface tension, viscosity.
3. Measure conductance of solutions, redox potentials of a cell.
4. Synthesize a small drug molecule and polymer.

List of Experiments:

1. Estimation of Mohr's salt using $KMnO_4$.
2. Estimation of Mohr's salt using $K_2Cr_2O_7$.
3. Determination of chloride ion content of water.
4. Determination of Hardness of water using EDTA method.
5. Determination of Fe(II) strength using $K_2Cr_2O_7$potentiometrically.
6. Determination on strength of NaOH using HCI conduct metrically.
7. Determination of surface tension.
8. Determination of Viscosity.
9. Determination of Saponification / acid value of oil.
10. Preparation of p-bromo acetanilide.
11. Preparation of Phenol Formaldehyde resin.
12. Determination of partition co-efficient of I_2 in water.
13. Determination of R_f value using TLC.
14. Verification of Freundlich isotherm using adsorption of acetic acid on activated charcoal.

CS/IT/CE/CH/EC/ EE/ME 162	Programming for Problem Solving Lab	L	T	P	C
		0	0	4	2

Course Objectives:

1. To know the basic problem solving process using Flow Charts and algorithms.
2. To understand the basic concepts of control structures in C.
3. To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. To use the concepts of structures, unions, files and command line arguments in C.

Course Outcomes:

1. Develop algorithm and flowchart for simple problems.
2. Use suitable control structures and arrays for developing code in C.
3. Design modular structured programs using functions and recursion.
4. Develop code for complex applications using structures, pointers and file handling features.

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations

CS/IT/CH/EC 163	Workshop Practice Lab	L	T	P	C
		1	0	4	3

Course Objectives:

Engineers, whatever be their line of activity, must be proficient with all aspects of manufacturing, however it should not be forgotten that practice without theory is blind and the theory without practice is lame.

1. Students involved in acquiring manufacturing skills must have balanced knowledge of theory as well as practice.
2. Imparts basic knowledge of various tools and their use in different sections of manufacture such as fitting, carpentry, tin smithy, moulding, casting, welding, electrical wiring, PCB work on electronic circuits and practice with machine shop tools &equipment's.

Course Outcomes:

1. Students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials.

Course Content:

Manufacturing Methods: (10 Periods)

1. Introduction to various types of manufacturing methods –casting - forming - various machining operations such as turning, milling, shaping, drilling, slotting etc. - various joining methods such as welding, brazing, soldering etc.,- Advanced manufacturing methods (3 Periods)
2. CNC machining and Additive manufacturing (1 Period)
3. Fitting operations and power tools (power hack saw, table mounted circular saw, wood turning lathe, bench grinder, concrete mixer, concrete vibrator etc.,) (1 Period)
4. Basic principles involved in electrical circuits and electronic PCB circuits(1Period)
5. Carpentry (1 Period)
6. Welding(arc welding & gas welding) (1 Period)
7. Metal casting (1 Period)
8. Plastic moulding, glass cutting (1 Period)

Text Books:

1. Hajra Choudhury S, K., Hajra Choudhury A.K and Nirjhar Roy S.K., "Elements of Workshop Technology", VolumeI and Volume II,2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S and Steven S.Schmid.,"Manufacturing Engineering and Technology" 4th edition, Pearson Education, India, 2002.
3. Rao P.N., "Manufacturing Technology", Volume I &II, Tata McGrawHill House, 2017

Work shop Practice: **[60]**

Course Objectives:

Students acquiring practical knowledge on various manufacturing techniques and will be able to fabricate components with their own hands.

Course Outcomes:

Up on completion of laboratory, students will be able to gain the manufacturing skills and get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

Section wise Experiments:

1. **Machine Shop(10 hours)**

Practice of machining operations on Lathe, Milling, Shapping, Drilling and Slotting Machines.
-Plain, step turning
-Plain, groove and thread cutting

2. **Fitting Shop(8 hours)**

-Inclined fit
-Half round fit

3. **Moulding and Casting(8 hours)**

-Hand wheel
-Stepped cone pulley

4. **Practice on electrical wiring and Electronic circuit boards(8 hours)**

- One bulb controlled by one switch &two bulbs in series controlled by one switch
- Measurement of resistance, voltage and current with the help of a multimeter & soldering an electronic PCB circuit

5. **Welding shop(both arc &gas welding) (8 hours)**

- Square butt joint
- Lap joint

6. **Carpentry(6 hours)**

- Half lap cross joint
- T-Lap joint

7. **Tin Smithy(6 hours)**

- Rectangular tray
- Funnel

8. **Plastic moulding and glass cutting(6 hours)**

- Practice on glass cutting

Text Book:

1. P.Kannaiah, K.L.Narayana., Workshop Manual, Second Edition, Scitech Publications (INDIA) Pvt.Ltd.

CS/IT/CH/EC 164	English Language Communication Skills Lab	L	T	P	C
		0	0	2	1

Course Objectives:

Identify speaker's purpose and tone; make inferences and predictions about spoken discourse, discuss and respond to content of a lecture or listening passage orally and/or in writing. Acquaint the students with the Standard English pronunciation, i.e., Receive Pronunciation (RP), with the knowledge of stress and intonation. Develop production and process of language useful for social and professional life. To develop in them communication and social graces necessary for functioning. Improve the dynamics of professional presentations. To develop critical reading and comprehension skills at different levels.

Course Outcomes:

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

1. Comprehend relationships between ideas and make inferences and predictions about spoken discourse.
2. Speak English with a reasonable degree of accuracy in pronunciation. .
3. Develop appropriate speech dynamics in professional situations.
4. Use effective strategies and social graces to enhance the value of communication.
5. The students are capable of using language effectively to face interviews with success.
6. Develop effective communication and presentation skills.
7. Students will be able to use higher order skills.

Oral Communication

(This unit involves interactive practice sessions in Language Lab)

1- Listening Comprehension
2- Pronunciation, Intonation, Stress and Rhythm
3- Common Everyday Situations: Conversations and Dialogues
4- Interviews
5- Formal Presentations
6- Reading Comprehension

Reference Books:

1. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press.
2. Practical English Usage. Michael Swan. OUP. 1995 Press
3. Exercises in Spoken English. Parts.I- III. CIEFL, Hyderabad. Oxford University

MC 002	Environmental Science	L	T	P	C
		2	0	0	0

Course Objectives:

To enable the students to

1. Understand that humans are an integral part of environment and hence their activities reflect on the environment.
2. realize and appreciate the importance of ancient practices and their importance in the present times
3. appreciate the contribution of individuals for the upkeep of environmental standards, in turn help the humans live better.

Course Objectives:

After successful completion of the course, the students are able to

1. evaluate the implications of human activities and thereby promote ecofriendly technologies.
2. promote awareness among the members of the society for a sustainable environment.
3. include and give priority to environmental protection in all developmental projects.

Course Content:

A. AWARENESS ACTIVITIES - SMALL GROUP MEETINGS

I. Source of water for human consumption/activities:

a. collection of information pertaining to water resources and consumption in Andhra Pradesh

b. Water resource on campus: General / Laboratory use and

c. Drinking water - understand the background and adopt judicious management.

d. Recycled water for Gardening - Particularly Lawns.

e. Cut down wastage of electricity in class rooms / labs / hostels etc. by avoiding misuse.

II. After the group meetings and exposure to the local issues and healthy practices, students motivated to make:

a. Posters

b. Slogans/One liners for promoting awareness

III. Lectures from Experts (at least 2 in the course duration)

IV. A walk in the neighborhood to promote a chosen theme on environmental consciousness.

B. ACTUAL ACTIVITIES

1. Plantation on Campus and on the sides of approach road.
2. Distribution of saplings to the local colony dwellers and encourage plantation.

3. Development of Kitchen garden on campus - Cultivation of at least leafy vegetables and creepers like cucumber etc. for use in college canteen/hostels etc.

4. Adoption of "NO PLASTICS" on campus.

5. Field trip to gain knowledge of biodiversity, water shed, mining, pollution and other local issues.

6. Preparation of working models for energy generation/transformation etc.

C. THEORY SYLLABUS FOR ASSESSMENT

Part-I

1. Introduction to Environmental Studies, Scope and Importance.
2. Natural resources Renewable and Non-Renewable; Definition and importance of the following resources in detail: a. Forest b. Water c. Land d. Energy
3. Sustainable development - Concept and Measures.
4. Biodiversity - Definition, Types of Biodiversity, Values and threats to Biodiversity, Conservation of biodiversity, IUCN classification: Endangered, Threatened, Vulnerable, Rare species; Endemic and Exotic species.
5. Climate change - Global warming, Ozone depletion and Acid rain.

Part-II

6. Water shed, water shed management in detail.
7. Solid wastes and Solid waste management.
8. Environmental Legislation, Environmental acts - Wild life protection act, Water act, Forest conservation act, Air act and Environmental protection act.
9. Case studies: Chernobyl nuclear disaster, Bhopal gas tragedy, Narmada bachaoandolan, Silent valley, Story of Tuvalu, Story of Ganga.
10.Earth summit and Kyoto protocol; Measures at individual level for conservation of natural resources and sustainable development.

Learning Resources:

Text Books:

1. Anubha Kaushik and C.P.Kaushik - Environmental Studies, 3rd Edition, New Age International Publishers, New Delhi., 2012.
2. R. Rajagopalan - Environmental studies from crisis to cure, 3rd Edition, Oxford University press, 2012.

ASSESSMENT

1. Two assessments each of 40 marks will be done in the semester. The split up of each assessment is as follows:

a. Two internal theory examinations will be conducted for 18 marks each.
b. Evaluation of the prepared activity sheets and working models will be done for 12M (continual evaluation) twice in the semester in line with the theory examination.
c. 5 Marks for attendance and 5 marks for oral test.

Note: Weightages for a, b & c will be taken as per the assessment guidelines of the R-18 curriculum and projected to 100 marks.

MC 003	Essence of Indian Traditional Knowledge	L	T	P	C
		2	0	0	0

Course Objectives:
To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

Course Outcomes:
At the end of the course, students will be able to
1. Understand the concept of traditional knowledge and its importance.
2. Apply significance of traditional knowledge protection.
3. Analyze the various enactments related to the protection of traditional knowledge.
4. Evaluate the concepts of intellectual property to protect the traditional knowledge and the traditional knowledge in different sectors.

Course Content:

UNIT I **CO 1** 8 Periods

Introduction to traditional knowledge: Definition of traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, characteristics, the historical impact of social change on traditional knowledge systems, traditional knowledge Vs western knowledge, traditional knowledge vis-à-vis formal knowledge.

UNITII **CO 2** 8 Periods

Protection of traditional knowledge: the need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT III **CO 3** 8 Periods

A: Legal frame work and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006; Plant Varieties Protection and Farmer's Rights Act, 2001 (PVPFR Act).
B: The Biological Diversity Act 2002 and Rules 2004 and the protection of traditional knowledge bill, 2016.

UNIT IV **CO 4** 8 Periods

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, Traditional knowledge in different sectors: Engineering, medicine system, biotechnology and agriculture, Management of biodiversity, Food security of the country and protection of TK.

Learning Resources:

Text Book:

1. Traditional Knowledge System in India, by Amit Jha, ATLANTIC Publishers, 2009.

References Books:

1. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan Publishers, 2012.
2. "Knowledge Traditions and Practices of India" by Kapil Kapoor and Michel Danino.

Web References:

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. https://nptel.ac.in/courses/121106003/