CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

B.Tech (CIVIL/MECH./PROD.)

SEMESTER – I

S.No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	18MT C01	Mathematics -I	3	1	-	3	30	70	4
2	18PY C03	Introduction To Mechanics And Electromagnetic Theory	3	1	-	3	30	70	4
3	18CS C01	Programming for Problem Solving	3	-	-	3	30	70	3
4	18EG C01	English	2	-	-	2	20	50	2
PRACTICALS									
5	18PY C06	Mechanics And Electromagnetic Lab	-	-	3	3	25	50	1.5
6	18CS C02	Programming for Problem Solving Lab	-	-	4	3	25	50	2
7	18ME C02	Workshop/ Manufacturing Practice	1	-	4	3	25	50	3
8	18EG C02	English Lab	-	-	2	2	15	35	1
		Total	**12**	**02**	**13**	**-**	**200**	**445**	**20.5**

L: Lecture   T: Tutorial   D: Drawing   P: Practical
CIE - Continuous Internal Evaluation   SEE - Semester End Examination

18MT CO1

MATHEMATICS– I
(Common to all branches and except for Bio-Tech)

Instruction	3 L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation:	30 Marks
Credits	4

Course Objectives:
1. To solve linear system of equations using Matrix Methods.
2. To know the convergence of the Series.
3. To represent the function in series form.
4. To know the Partial Derivatives and use them to interpret the way a function of two variables behaves.
5. To learn Vector Differential Operator and its Physical interpretations on Scalars and vector functions.
6. To solve improper integrals.

Course Outcomes: On the successful completion of this course student shall be able to
1. Solve system of linear equations and identify the Eigen values and Eigen vectors in engineering problems.
2. Check the series convergence.
3. Find the evolutes of the given curves.
4. Expand and find extreme values of functions of two variables.
5. Understanding the significance of gradient, divergence and curl.
6. An ability to solve the problems and interpret in geometrical approach.

UNIT-I: Matrices:
Rank of the matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Eigenvalues, Eigenvectors, Properties of eigenvalues, Cayley-Hamilton theorem, Quadratic forms, Diagonalization of Matrices, Reduction of quadratic form to canonical form by linear transformation, Nature of quadratic forms.

UNIT-II: Sequences and Series:
Definition of Convergence of sequence and series. Tests for convergence of series: comparison test, limit comparison test, D'Alembert ratio test, Raabes test, Cauchy's n^{th} root test, logarithmic test, alternative series, absolute and conditional convergence.

UNIT-III: Calculus:
Rolle's Theorem, Lagranges Mean value theorem, Cauchy's mean value theorem (without proofs). Curvature, radius of curvature, Evolutes and involutes ,
Fourier series, half range sine and cosine series.

UNIT-IV: Multivariable Calculus (Differentiation):
Functions of two variables, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobian, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum values of functions two variables, Lagrange's multipliers method.

UNIT-V: Vector Calculus (Differentiation):
Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, vector identities. Improper integrals: Beta and Gamma functions and their properties.

Text Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

Suggested Reading:
1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
2. R.K. Jain, S.R.K. Iyengar, Advanced engineering mathematics Narosa Publications, 5th edition, 2016. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

18PY C03

**INTRODUCTION TO MECHANICS AND ELECTROMAGNETIC
THEORY
(for Civil, Mech & Prod)**

Instruction:	3L+1T Hours per Week
Duration of Semester End Examination:	3 Hours
Semester End Examination:	70 Marks
Continuous Internal Evaluation:	30 Marks
Credits:	4

Course Objectives:
The objectives of the course is to make the student
1. Understands the fundamentals of oscillations and ultrasonics.
2. Gains knowledge of rigid body dynamics.
3. Learns the basics of electrostatics.
4. Understands the fundamentals of magnetostatics.
5. Familiar with electromagnetic waves.

Course Outcomes:
At the end of the course, the student will be able to
1. Describe the types of oscillations and analyze them.
2. Develop the concepts of dynamics and apply them to solve the related problems.
3. Analyze the role of different laws in electrostatics.
4. Discuss the significance of magnetostatics.
5. Develop the concepts related to electromagnetic behavior.

UNIT- I :Oscillations:
Simple harmonic motion, Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-   damped oscillators; Forced oscillations and resonance.
Ultrasonics: Production of ultrasonics by piezoelectric and magnetostriction methods – Detection of ultrasonics -– Determination of ultrasonic velocity in liquids – Applications.

UNIT-II: Rigid body Dynamics:
Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples. two-dimensional motion in terms of (a) Angular velocity vector, and its rate of change and (b) Moment of inertia tensor.

UNIT- III :Electrostatics in Vaccum:

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction, Boundary conditions of electric field and electrostatic potential.

UNIT - IV : Magnetostatics:

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities: ferromagnetic, paramagnetic and diamagnetic materials, B-H curve.

UNIT- V : Electromagnetic Waves:

The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves, Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples.

TEXT BOOKS:

1. B.K. Pandey and S. Chaturvedi, *Engineering Physics*, Cengage Publications, 2012.
2. M.N. Avadhanulu and P.G. Kshirsagar, *A Text BookEngineering Physics*, S. Chand Publications, 2014.
3. M. Arumugam, *Materials Science*, Anuradha Publications, 2015.
4. S.L. Gupta and Sanjeev Gupta, *Modern Engineering Physics*, Dhanpat Rai Publications, 2011.

SUGGESTD READING:

1. R. Murugeshan and Kiruthiga Sivaprasath, *Modern Physics*, S. Chand Publications S. Chand Publications, 2014.
2. V. Rajendran, *Engineering Physics*, McGahill Education Publications, 2013.
3. P.K. Palanisamy, *Engineering Physics*, Scitech Publications, 2012.
4. V. Raghavan, *Materials Science and Engineering*, Prentice Hall India Learning Private Limited; 6th Revised edition, 2015.

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18CS C01

Programming for Problem Solving
(Common to All Programs)

Instruction	3 Periods per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	70 Marks
Sessional	30 Marks
Credits	3

Course Objectives
1. Identification of computer components, Operating environments, IDEs
2. Understanding the steps in problem solving and formulation of algorithms to problems.
3. Develop programming skills as an means of implementing an algorithmic solution with appropriate control and data structures.
4. Develop intuition to enable students to come up with creative approaches to problems.
5. Manipulation of text data using files.

Course Outcomes: At the end of the course, students will be able to:
1. Identify the computing environments.
2. Formulate solutions to problems and represent them using algorithms/ Flowcharts.
3. Choose proper control statements and data structures to implement the algorithms.
4. Trace the programs with test the program solution.
5. Decompose a problem into modules and use functions to implement the modules.
6. Develop applications using file I/O.

UNIT -I
Introduction to computers and Problem Solving: Components of a computer, Operating system, compilers, Program Development Environments, steps to solve problems, Algorithm, Flowchart / Pseudocode with examples.

Introduction to programming: Programming languages and generations, categorization of high level languages.

Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, constants, I/O statements, operators, precedence and associativity.

UNIT – II
Introduction to decision control statements: Selective, looping and nested statements.

Functions: Introduction, uses of functions, Function definition, declaration, passing parameters to functions, recursion, scope of variables and storage classes.

Case study:
UNIT – III
Arrays: Introduction, declaration of arrays, accessing and storage of array elements, 1-dimensional array, Searching (linear and binary search algorithms) and sorting(selection and Buble) algorithms, 2-D arrays, matrix operations.
Strings: Introduction, stringsrepresentation, string operations with examples.

Case study:
UNIT – IV
Pointers: Understanding computer's memory, introduction to pointers, declaration pointer variables, pointer arithmetic, pointers and strings, array of pointers, function pointers, array of function pointers, dynamic memory allocation, advantages and drawbacks of pointers.

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, structures and functions, self- referential structures, unions and enumerated data types.

UNIT-V
Files: Introduction to files, file operations, reading data from files, writing data to files, error handing during file operations.
Preprocessor Directives: Types of preprocessor directives, examples.

Suggested Reading:
1. A K Sharma "**Computer Fundamentals and Programming**", 2nd Edition, University Press, 2018.
2. PradeepDey and Manas Ghosh, "**Programming in C''**, Oxford Press, 2nd Edition, 2017.

References:
1. Byron Gottfried, Schaum's"**Outline of Programming with C**", McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
4. ReemaTharaja "**Introduction to C Programming**", Second Edition, OXFORD Press,2015.
5. https://www.tutorialspoint.com/cprogramming/index.htm
6. https://onlinecourses.nptel.ac.in/noc18-cs10/preview.

18EG C01

ENGLISH
(Common to all branches)

Instruction   2Hours per week
Duration of Semester End Examination   2 Hours
Semester End Examination   50 Marks
Continuous Internal Evaluation: 20 Marks
Credits   2

Course Objectives:

1. To enable the students to understand the role and importance of communication and to develop their basic communication skills in English.
2. To equip the students with basics of writing correct sentences to coherent paragraphs.
3. To equip the students with techniques of writing a précis and an essay by using accurate grammar and appropriate vocabulary.
4. To train the students to describe, define and classify processes and to draft formal reports by adhering to the proper structure.
5. To develop the reading skills and reading comprehension techniques of the students.
6. To develop the students reading, writing, grammatical, lexical and communicative competence.

Course Outcomes:
1. The students will understand the nature, process and types of communication and will communicate effectively without barriers.
2. The students will write correct sentences and coherent paragraphs.
3. The students will know how to condense passages by writing précis and write essays by using accurate grammar and appropriate vocabulary.
4. The students will demonstrate advanced writing skills by drafting formal reports.
5. The students will apply their reading techniques and analyze reading comprehension passages.
6. The students will become effective communicators and will display their advanced skills of reading and writing and use correct grammar and appropriate vocabulary in all contexts.

UNIT-IUnderstanding Communication in English:
Introduction, nature and importance of communication.Process of communication.Basic types of communication - verbal and non-verbal.Barriers to communication.Intrapersonal and interpersonal communication.Johari Window
Vocabulary &Grammar: The concept of Word Formation. Importance of proper punctuation.Articles.

UNIT- II Developing Writing Skills I:
Types of sentences.Use of phrases and clauses in sentences.Cohesion and coherence.Paragraph writing.Organizing principles of paragraphs in documents.Vocabulary & Grammar: Cohesive devices. Root words from foreign languages and their use in English. Prepositions.

UNIT- III Developing Writing Skills II:
Techniques for writing precisely. Précis Writing. Essay Writing.
Vocabulary and Grammar: Subject-verb agreement, Noun-pronoun agreement
Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Redundancies, Clichés.

UNIT- IV Developing Writing Skills III:
Describing, Defining, Classifying, Providing examples or evidence.Writing introduction and conclusion.
Report writing – Importance, structure and elements of style of formal reports.
Vocabulary and Grammar: Misplaced modifiers. Synonyms, antonyms.

UNIT-VDeveloping Reading Skills:
The reading process, purpose, different kinds of texts. Reading comprehension.Techniques of comprehension – skimming, scanning, drawing inferences and conclusions.
Vocabulary and Grammar : Words often Confused. Standard abbreviations.

Text Books:
1. Language and Life: A Skills Approach, Board of Editors, Orient Black Swan, 2017.
2. Swan Michael,Practical English Usage.OUP. 1995.

Suggested Readings:
1. Wood F.T,Remedial English Grammar, Macmillan,2007
2. Zinsser William,On Writing Well, Harper Resource Book, 2001
3. Sanjay Kumar and PushpLata,Communication Skills.Oxford University Press, 2011.

18PY C06
MECHANICS AND ELECTROMAGNETIC LABORATORY
(for Civil, Mech & Prod)

Instruction:	3 Hours per Week
Duration of Semester End Examination:	3 Hours
Semester End Examination:	50 Marks
Continuous Internal Evaluation:	25 Marks
Credits:	1.5

Course Objectives:
The objectives of the course is to make the student
1. Apply theoretical physics knowledge in doing experiments.
2. Understand the various kinds of oscillators.
3. Analyze the behavior of magnetic and dielectric materials.

Course Outcomes:
At the end of the course, the student will be able to
1. Understand the concept of errors and find the ways to minimize the errors
2. Demonstrate the various kinds of oscillations.
3. Determine the loss of energy of a ferromagnetic material and its uses in electrical engineering .
4. Understand the suitability of dielectric materials in engineering applications.
5. Use LCR circuits in different applications.

Experiments
1. *e/m* of Electron by Thomson's Method.
2. B-H curve – Determination of Hall coefficient, carrier concentration & mobility of charge carriers of given semiconductor specimen.
3. Stewart & Gee's.
4. Mutual induction.
5. Dielectric constant – Determination of dielectric constant of given PZT sample.
6. Error analysis – Estimation of errors in the determination of time period of a torsional pendulum.
7. Helmholtz's resonator.
8. Compound pendulum.
9. Flywheel.
10. Coupled oscillator.
11. LCR circuit.
12. Melde's experiment.
13. Young's modulus.
14. Viscosity by oscillating disc (Lamp scale method).

15. Ultrasonic interferometer – Determination of velocity of ultrasonics in a given liquid.

SUGGESTED READING:
1. *Engineering Physics Manual* by Department of Physics, CBIT, 2016.
2. S.K. Gupta*, Engineering Physics Practical*, Krishna's Educational Publishers, 2014.
3. O.P. Singh, V. Kumar and R.P. Singh, *Engineering Physics Practical Manual*, Ram Prasad & Sons Publications, 2009.
4. Indu Prakash, Ram Krishna and A.K. Jha, *A Text Book of Practical Physics*, Kitab Mahal Publications, 2012.

18CS C02

Programming for Problem Solving
(Programming Lab – I)
(Common to All Programs)

Instruction	4 Periods per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives
1. Setting up programming environment.
2. Develop Programming skills to solve problems.
3. Use of appropriate C programming constructs to implement algorithms.
4. Identification and rectification of coding errors in program.
5. Develop applications in a modular fashion.
6. Manage data using files.

Course Outcomes:
At the end of the course students will be able to:
1. Identify and setup program development environment.
2. Implement the algorithms using C programming language constructs.
3. Identify and rectify the syntax errors and debug program for semantic errors.
4. Analyze the results to evaluate the solutionsof the problems.
5. Solve problems in amodular approach using functions.
6. Implement file operations with simple text data.

Lab experiments
1. Familiarization with programming environment.
2. Simple computational problems using arithmetic expressions.
3. Problems involving if-then-else structures.
4. Iterative problems e.g., sum of series.
5. 1D Array manipulation.
6. 2D arrays and strings.
7. Matrix problems, String operations.
8. Simple functions.
9. Recursive functions.
10. Pointers and structures.
11. Dynamic memory allocation and error handling.
12. File handling.

Design the experiments in such a way that the students will be able to end up the solution for a real world problem that uses most of the concepts of C programming language. For example: A banking application where it uses the concepts of operators, control structures, switch case for menu, structures, functions, error handling, files etc.

Suggested Reading:
1. Pradeep Dey and Manas Ghosh, "**Programming in C"**, Oxford Press, 2nd Edition, 2017.
2. ReemaTharaja "**Introduction to C Programming**", Second Edition, OXFORD Press,2015.

References:
1. https://www.tutorialspoint.com/cprogramming/index.htm
2. https://www.w3resource.com/c-programming/programming-in-c.php
3. https://www.w3schools.in/c-tutorial/

18ME C02
WORKSHOP/ MANUFACTURING PRACTICE

Instruction	1T+4P Hours per week
Duration of End Examination	3 Hours
Semester End Examination	50 Marks
Continuous Internal Evaluation:	25 Marks
Credits	3

Course Objectives:
1. Give a feel of Engineering Practices & develop holistic understanding of various Engineering materials and Manufacturing processes.
2. Develop skills of manufacturing, safety, precision, quality, intelligent effort, optimization, positive & team work attitude to get things right the first time.
3. To provide basic knowledge of Steel, Plastic, Composite and other materials for suitable applications.
4. Study of Principle and hands on practice on techniques of fabrication, welding, casting, manufacturing, metrology, and allied skills.
5. To advance important hard & pertinent soft skills, productivity, create skilled manpower which is cognizant of industrial workshop components and processes and can communicate their work in a technical, clear and effective way.
6. Engineering Skill development with regard to making components, system integration and assembly to form a useful device.

Course Outcomes – (Laboratory): Student will be able to
1. Fabricate components with their own hands.
2. Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. Assembling different components, student will be able to produce small mechanisms/devices of their interest.
4. Gain practical skills of carpentry, tinsmithy, fitting, house wiring.
5. Gain knowledge of different Engineering Materials and Manufacturing Methods.
6. Understand trades and techniques used in Workshop and chooses the best material/ manufacturing process for the application.

18EG C02

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ENGLISH LAB

(Common to all branches)
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Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
Continuous Internal Evaluation:	15 Marks
Credits	1

Course Objectives:
1. To introduce students to phonetics and the different sounds in English.
2. To familiarize the students with the software and give them sufficient practice in correct pronunciation.
3. To enable students to speak English correctly with focus on stress and intonation.
4. The students will enhance their listening skills by practicing IELTS and TOEFL material.
5. To help students overcome their inhibitions while speaking in English and to build their confidence. The focus shall be on fluency rather than accuracy.
6. To help students to understand team work, role behavior and to develop their ability to discuss in groups and make oral presentations.

Course Outcomes:
1. The students will differentiate the speech sounds in English.
2. The students will interact with the software and understand the nuances of pronunciation in English.
3. The students will speak with the proper tone, intonation and rhythm and apply stress correctly.
4. The students will demonstrate their listening skills by analyzing the IELTS and TOEFL listening comprehension texts.
5. The students will speak with clarity and confidence.
6. The students will work in teams and discuss various topics and demonstrate their presentation skills through posters.

Exercises
1. **Introduction to English Phonetics**: Introduction to auditory, acoustic and articulatory phonetics, organs of speech: the respiratory, articulatory and phonatory systems.
2. **Sound system of English**: Phonetic sounds and phonemic sounds, introduction to international phonetic alphabet, classification and description of English phonemic sounds, minimal pairs . The syllable: types of syllables, consonant clusters.
3. **Word stress**: Primary stress, secondary stress, functional stress, rules of word stress.

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4. **Rhythm &Intonation** : Introduction to Rhythm and Intonation. Major patterns, intonation of English with the semantic implications.
5. **Listening skills** – practice with IELTS and TOEFL material.
6. **Situational dialogues and role play –** Dialogue writing, **–** Role behavior and role enactment.
7. **Group Discussions -** Dynamics of a group discussion, group discussion techniques, body language.
8. **Public speaking –** Speaking with confidence and clarity in different contexts on various issues.
9. **Poster presentation –** Theme, poster preparation, team work and presentation.

Suggested Reading

1. T Balasubramanian. A Textbook of English Phonetics for Indian Students, Macmillan, 2008.
2. J Sethi et al. A Practical Course in English Pronunciation (with CD), Prentice Hall India, 2005.
3. PriyadarshiPatnaik. Group Discussions and Interviews, Cambridge University Press Pvt Ltd 201.
4. ArunaKoneru, Professional Speaking Skills, Oxford University Press, 2016.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

B.E. (CIVIL/MECH./PROD.)

SEMESTER – II

S. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	18MT C03	Mathematics -II	3	1	-	3	30	70	4
2	18CY C01	Chemistry	3	1	-	3	30	70	4
3	18CE C01	Engineering Mechanics	3	1	-	3	30	70	4
4	18ME C01	Engineering Graphics and Design	1	-	4	3	30	70	3
5	18EE C01	Basic Electrical Engineering	3	1	-	3	30	70	4
PRACTICALS									
6	18EE C02	Basic Electrical Engineering Lab	-	-	2	2	15	35	1
7	18CY C02	Chemistry Lab	-	-	3	3	25	50	1.5
		Total	13	04	09	-	190	435	21.5

L: Lecture   T: Tutorial   D: Drawing   P: Practical
CIE - Continuous Internal Evaluation   SEE - Semester End Examination

18MT CO3

MATHEMATICS– II
(Common to all branches and except for Bio-Tech)

Instruction	3 L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation:	30 Marks
Credits	4

Course Objectives
1. To evaluate double and triple integrals of various functions and their significance.
2. To evaluate vector line, surface and volume integrals.
3. To know the relevant method to solve higher order differential equations.
4. To evaluate complex integration.
5. To evaluate real and definite integrals.
6. To know the methods to solve real life problems.

Course Outcomes: On the successful completion of this course student shall be able to
1. Find the areas, volumes and surface of solids revolution.
2. Use Greens, Gauss and Stoke's theorems to find the surface and volume integrals.
3. Able to solve solutions of differential equations with initial and boundary value problems.
4. Solve the problems on analytic functions, Cauchy's theorem and Cauchy's integral formula.
5. Real and complex integrals by using Cauchy's theorems.
6. Solve physical and engineering problems.

UNIT-I: Multivariable Calculus (Integration):
Applications of definite integrals to evaluate surface areas and volumes of revolutions. Double integrals, Change of order of integration, Triple integrals, Change of variables in integrals, Applications: areas and volumes, Centre of mass and Gravity (constant and variable densities).

UNIT-II: Vector Integral Calculus:
Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem and Stroke's theorem (without proof).

First Order Ordinary Differential Equations: Exact first order differential equations , Integrating factors, Linear first order equations , Bernoulli's, Riccati's and Clairaut's differential equations ,Orthogonal trajectories of a given family of curves.

UNIT-III: Ordinarydifferential equations of higher orders:
Solutions of higher order linear equations with constants coefficients, Method of variation of parameters, solution of Euler-Cauchy equation. Ordinary point, singular point and regular singular point, Power Series solution. Legendre Polynomial of first kind (without proof), Rodrigues formula, Generating function, recurrence relations, orthogonality of Legendre polynomials, Bessel's function of first kind (without proof), recurrence relations and problems.

UNIT- IV: Complex Variables –I :
Differentiation, analytic functions, Cauchy-Riemann equations, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties. Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof).

UNIT- V: Complex Variables – II:
Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, Laurent's series, zeros of analytic functions, singularities, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine. Improper real integrals with singular points on the upper half plane.

Text Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Suggested Reading:
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. R.K. Jain, S.R.K. Iyengar, Advanced engineering mathematics Narosa Publications,5th edition,2016.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

18CY C01

CHEMISTRY

(Common to all branches)

Instruction:	3L+1T Hours per Week
Duration of Semester End Examination:	3 Hours
Semester End Examination:	70 Marks
Continuous Internal Evaluation:	30 Marks
Credits:	4

Course Objectives
1. The aim of framing the syllabus is to impart intensive and extensive knowledge of the subject so that students can understand the role of chemistry in the field of engineering.
2. This syllabus helps at providing the necessary introduction of the inorganic chemistry principles and concepts of chemical bonding involved in a comprehensive manner understandable to the students aspiring to become practicing engineers.
3. Thermodynamic and Electrochemistry units give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems.
4. To teach students the value of chemistry and to improve the research opportunities knowledge of stereochemistry and organic reactions is essential.
5. New materials lead to discovering of technologies in strategic areas like defense and space research for which an insight into nano and composite materials of modern chemistry is essential.

Course Outcomes
The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels; one has to base the description of all chemical processes at molecular levels. The course will enable the student to:
1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Rationalize bulk properties and processes using thermodynamic considerations & Ionic Equilibria.
3. List major chemical reactions that are used in the synthesis of molecules.
4. Apply the various methods used in treatment of water for domestic and industrial use.

5. Discuss the various Engineering materials & Drug synthesis & their applications.

UNIT-I   Atomic and molecular structure:

Molecular Orbital theory - atomic and molecular orbitals.Linear combination of atomic orbitals (LCAO) method. Molecular orbitals of diatomic molecules. Energy level diagrams of diatomics (H_2, He_2^+, N_2, O_2, O_2^-, CO, NO). Pi- molecular orbitals of butadiene , benzene and their aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.

UNIT-II Use of free energy in chemical equilibria and Ionic Equilibria:

Use of free energy in chemical equilibria : Thermodynamic functions: Internal energy, entropy and free energy. Significance of entropy and free energy(criteria of spontaneity).Free energy and emf (Gibbs Helmholtz equations and its applications). Cell potentials –electrochemical series.Nernst equation and its applications.Potentiometric Acid base & Redox Titrations.Numericals.

Ionic Equilibria: Solubility product, Determination of solubility product, Applications of solubility product- Determination of solubilities of sparingly soluble salts; Predicting precipitation reactions; Precipitation of an insoluble salt; Precipitation of soluble salts ; Inorganic analysis .Numericals.

UNIT- III Stereochemistry and Organic reactions

 Stereochemistry: Representations of 3 dimensional structures , Symmetry and chirality, Stereoisomers - Configurational isomers (Geometrical&Optical isomers), Conformational isomers - Newman and sawhorse representations of n-butane ,enantiomers (lactic acid), diastereomers (Tartaric acid) , optical activity, absolute configurations , Sequence rules for R&S notation.

Organic reactions

Types of Organic reactions:

Substitution Reactions- Electrophilic substitution (Nitration of Benzene) ;Nucleophilic Substitution(S_N1& S_N2) ; Free Radical Substitution(Halogenation of Alkanes)

Additions Reactions:

Electrophilic Addition – Markonikoff's rule

Nucleophilic Addition – (Addition of HCN to carbonyl compounds)

Free radical Addition - Anti Markonikoff's rule (Peroxide effect)

Eliminations-E_1 and E_2 (dehydrohalogenation of alkyl halides)

Oxidation with $KMno_4$, $K_2Cr_2O_7$; **Reduction** with $LiAlH_4$,$NaBH_4$

Cyclization (Diels - Alder reaction)

UNIT–IV Water Chemistry:

Hardness of water – Types, units of hardness, Disadvantages of hard water , Boiler troubles - scales & sludge formation , causes and effects , Softening of water by ion exchange method and Reverse Osmosis. Specifications of potable water & industrial water. Disinfection of water by Chlorination , Ozonisation & UV radiation.

UNIT-V Engineering Materials and Drugs:

Nano materials-Introduction to nano materials and general applications, basic chemical methods of preparation- Sol gel method. Carbon nanotubes and their applications.

Composite materials- Definition, types of composites, fibre reinforced, glass fibre reinforced and carbon fibre reinforced composites and applications.

Conducting polymers- Definition, classification and applications.

Drugs-Introduction,Synthesis and uses of Aspirin (analgesic), Paracetamol (Antipyretic), Atenolol (antihypertensive).

TEXT BOOKS

1. P.C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company Ltd., New Delhi,16th edition (2015).
2. W.U. Mali, G.D.Tuli and R.D.Madan, "Selected topics in Inorganic Chemistry", S Chand & Company Ltd, New Delhi, reprint (2009).
3. R.T. Morrison, R.N. Boyd and S.K. Bhattacharjee, "Organic Chemistry", Pearson, Delhi, 7th edition(2011).
4. G.L. David Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, K.L.N. Reddy and C. Sudhakar, "Drugs", Universities Press (India) Limited, Hyderabad (2007).

SUGGESTED READINGS

1. B. H. Mahan, "University Chemistry", Narosa Publishing house, New Delhi, 3rd edition (2013).
2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & CompanyLtd.,46th edition(2013).
3. T.W. Graham Solomons, C.B. Fryhle and S.A. Snyder, "Organic Chemistry", Wiley,12th edition (2017).
4. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8thedition (2006).

18CE C01

ENGINEERING MECHANICS

Instruction:	3L+1T Hours per Week
Duration of Semester End Examination:	3 Hours
Semester End Examination:	70 Marks
Continuous Internal Evaluation:	30 Marks
Credits:	4

Course Objectives:
1. The objective of this course is to understand the resolution of forces and to obtain resultant of all force systems, to understand moment of a force and equilibrium conditions of static loads for smooth and frictional surface
2. To obtain centroid, centre of gravity and moment of inertia for various regular and composite areas and bodies.
3. To understand the basic structural analysis, principles of virtual work and energy methods.
4. To know the basic concepts of dynamics and analysis as a particle and rigid bodies.
5. To understand the work energy principles, impulse momentum and their applications and to know the concept of simple harmonic motion and free vibration.

Course Outcomes: The students will be able to
1. Solve problems dealing with forces in plane and space force systems, draw free body diagrams to analyze various problems in equilibrium, for smooth and frictional surface.
2. Determine centroid and moment of inertia for elementary, composite areas and bodies.
3. Analyze simple trusses for forces in various members of a truss.
4. Solve problem in kinematics and kinetics of particles and rigid bodies.
5. Analyze body motion using work energy principles, impulse and momentum approach and able to apply the concepts of simple harmonic motion and free vibrations in dynamics.

Unit–I: Resolution, Resultant and Equilibrium of force system and Friction:
Concepts of force, System of forces, components of forces in a plane and in space systems.Resultant of force systems.Moment of forces and its applications.Couples and its applications.Equilibrium of Force systems. Free body diagrams, equation of equilibrium of coplanar and spatial force systems. Static indeterminacy. Types of friction, Laws of friction, application of friction to a single body & connecting systems, wedge friction.

Unit–II: Centroid, centre of gravity and moment of Inertia:
Centroid of simple figures from first principle, centroid of composite sections. Centre of gravity and its implications, Definition of Area moment of Inertia, Moment of inertia of plane section from first principles, Theorems of moment of inertia, moment of inertia of standard sections and composite sections, Mass moment of inertia of rectangular and circular plates, cylinder, cone & sphere.

Unit–III: Analysis of simple trusses, Virtual work and Energy methods:
Analysis of simple trusses using method of joints, methods of sections. Determine if a member is in tension or compression, zero force members. Virtual displacements, Principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom.Conservative forces and potential energy, energy equation for equilibrium.

Unit–IV: Particle Dynamics:
Rectilinear and curvilinear translation using rectangular, normal and tangential components.Relative and constrained motion. Newton's 2nd Law, rectangular and path coordinates. Basic terms, general principles in dynamics, D'Alembert's principle and its application in plane motion and connected bodies.Instantaneous centre of rotation in plane motion and simple problems.

Unit–V: Work- Energy, Impulse-momentum and Mechanical Vibrations:
Equation of work energy for translation and fixed axis rotation, work energy principles applied to particle motion, connected systems. Introduction to linear impulse momentum, principle of conservation of linear momentum, Impact, direct and oblique. Introduction to vibration, free and forced vibrations, simple harmonic motion, simple pendulum and compound pendulum.

Text Books:
1. Reddy Vijaykumar K. and J. Suresh Kumar," Singer's Engineering Mechanics Statics and Dynamics", B. S. Publications 2011.
2. A. Nelson, "Engineering Mechanics", Tata McGraw Hill, New Delhi, 2010.

Suggested Reading:
1. Irving H. Shames, "Engineering Mechanics", 4th Edition, Prentice Hall, 2006.
2. F. P. Beer and E. R .Johnson, "Vector Mechanics for engineers, Vol. I - Statics, Vol. II - Dynamics",
    9thedition, Tata McGraw Hill, 2011.
3. R. C. Hibbeler, "Engineering Mechanics: Principles of Statics and Dynamics", Pearson Press, 2006.

18ME C01

ENGINEERING GRAPHICS AND DESIGN

Instruction	1T+4D Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation:	30 Marks
Credits	3

Course Objectives:
1. to prepare to design a system, component, or process to meet desired needs within realistic constraints.
2. to prepare the student to communicate effectively.
3. to prepare the student to use the techniques, skills, and modern. engineering tools necessary for engineering practice.
4. to get exposure to a CAD package.

Course Outcomes:
1. Introduction to engineering design and its place in society.
2. Exposure to the visual aspects of engineering design.
3. To become familiar with engineering graphics standards.
4. Exposure to solid modelling.
5. Exposure to computer-aided geometric design.
6. Exposure to creating working drawings.
7. Exposure to engineering communication.

Detailed contents
Traditional Engineering Graphics:
Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views;
Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.
Computer Graphics:
Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Coordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling; Introduction to Building Information Modeling (BIM).
(Except the basic essential concepts, most of the teaching part can happen concurrently in the laboratory).

UNIT-1 Introduction to Engineering Drawing:
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute;

25

UNIT-2 Orthographic Projections:

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes (without traces) ; Projections of planes inclined Planes;

Introduction to CAD package:

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids.

UNIT-3 Projections of Regular Solids:

Projection of Prism, Cylinder, Pyramid and Cone : Simple position, axis inclined to one of the reference plane only. Customization & CAD Drawing: consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

UNIT-4 Sections and Sectional Views of Right Angular Solids:

Sections of solids in simple position Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids.

Annotations, layering & other functions:

applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); rinting documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and twodimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

UNIT-5 Isometric Projections:

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Viceversa, Conventions;

Demonstration of a simple team design project:
Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; geometric dimensioning and tolerancing;
Use of solid-modeling software for creating associative models at the component and assembly levels; (Examples of specific components to the branch of study may be included).

Text Books:
1. N.D.Bhatt, Elementary Engineering Drawing, Charotar Publishers,2012.
2. K.L.Narayana and P.K.Kannaiah, –Text Book of Engineering Drawing Scitech Publications, 2011.
3. Basanth Agrawal and C M Agrawal –Engineering Drawing 2e –, McGraw-Hill Education(India) Pvt.Ltd.

Suggested Reading:
1. Shaw M.B and Rana B.C., –Engineering drawing Pearson, 2ndedition, 2009.
2. K.Veenugopal, –Engineering Drawing and Graphics + Autocad New Age International Pvt.Ltd,2011.
3. Bhattacharya. B, –Engineering Graphics I. K. International Pvt.Ltd, 2009.

18EE C01
BASIC ELECTRICAL ENGINEERING

Instruction: 3L+1T Hours per Week
Duration of Semester End Examination: 3 Hours
Semester End Examination: 70 Marks
Continuous Internal Evaluation: 30 Marks
Credits: 4

Course Objectives:
1. To understand the behavior of different circuit elements R,L & C, and the basic concepts of electrical circuit analysis.
2. To know the concepts of AC circuits, RMS value, Average value, Phasor analysis etc., 3. To understand the basic principle of operation of Transformer and DC machines.
4. To understand the basic principle of operation of DC machines and AC machines.
5. To know about different types of electrical wires and cables, domestic and industrial wiring.
6. To understand safety rules and methods of earthing.

Course Outcomes: At the end of the course, the student will be able to
1. Acquire the concepts of Kirchhoff's laws and network theorems and able to get the solution of simple dc circuits.
2. Obtain the steady state response of RLC circuits and also determine the different powers in AC circuits.
3. Acquire the concepts of principle of operation of Transformers and DC machines.
4. Acquire the concepts of principle of operation of DC machines and AC machines.
5. Acquire the knowledge of electrical wiring and cables and electrical safety precautions.
6. Recognize importance of earthing and methods of earthing and electrical installations.

UNIT-I: 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, Time-domain analysis of first order RL and RC circuits.

UNIT-II: 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: Transformers

Construction, Working principle, EMF Equation, Ideal and Practical transformer, Equivalent circuit of Transformer, OC and SC tests on a transformer, Efficiency and Regulation, Auto transformer

UNIT-IV: DC and AC Machines

DC Generators: Construction, Principle of operation, EMF equation, Classification, Characteristics of shunt, series and compound generators. DC Motors: Classification, Torque equation, Characteristics, Efficiency, Speed Control of Series and Shunt Motors. Three - Phase Induction Motors: Construction, Principle of operation, Torque equation, torque-slip characteristics, Power stages, speed control of induction motors.

UNIT-V: Electrical Installations

Electrical Wiring: Types of wires and cables, Electrical Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, safety rules.
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Earthing, Elementary calculations for energy consumption.

Text books:
1. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011.
2. E. Hughes, Electrical and Electronics Technology, Pearson, 2010.

Suggested Reading:
1. D. P. Kothari & I. J. Nagrath, –Basic Electrical Engineering .Tata McGraw Hill, 2010.
2. V. D. Toro, –Electrical Engineering Fundamentals Prentice Hall India, 1989.
3. D.C. Kulshreshtha, –Basic Electrical Engineering McGraw Hill,2009
4. P.V.Prasad, S.sivanagaraju, R.Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1st Edition, 2013.

18EE C02

BASIC ELECTRICAL ENGINEERING LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
Continuous Internal Evaluation:	15 Marks
Credits	1

Course Objectives:
1. To acquire the knowledge of different types of electrical elements.
2. To verify the basic electrical circuit laws and theorems.
3. To determine the parameters and power factor of a coil.
4. To calculate the time and frequency responses of RLC circuits
5. To determine the characteristics of Transformers.
6. To determine the characteristics of dc and ac machines.

Course Outcomes: At the end of the course, the students are expected to
1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the circuit analysis techniques.
4. Determine the parameters of the given coil.
5. Understand the basic characteristics of transformer.
6. Understand the basic characteristics of dc and ac machines.

List of Laboratory Experiments/Demonstrations:
1. Demonstration of Measuring Instruments and Electrical Lab components
2. Verification of KCL and KVL.
3. Time response of RL and RC circuits.
4. Calculation of permittivity of a choke or coil by Wattmeter Method.
5. Verification of Thevenin's and Norton's theorems.
6. Turns ratio /voltage ratio verification of 1-Ph Transformers.
7. OC and SC tests on a given 1-Ph Transformer.
8. Observation of Excitation Phenomenon in Transformer.
9. Measurement of 3-Ph power in a balanced system (By 2- Wattmeter method).
10. Measurement of 3-Ph Energy by an Energy Meter (Demonstration of Principle).
11. Load test of DC Shunt motor.
12. Speed control of DC Shunt motor.
13. Load test of 3-Ph Induction motor.
14. Demonstration of LT Switchgear Equipment/Components.
15. Demonstration of cut - out section of Machines like DC Machine, Induction Machine, etc.

Note: at least **TEN** experiments should be conducted in the semester.

18CY C02

CHEMISTRY LAB

(Common to all branches)

Instruction:	3 Hours per Week
Duration of Semester End Examination:	3 Hours
Semester End Examination:	50 Marks
Continuous Internal Evaluation:	25 Marks
Credits:	1.5

Course Objectives

1. To impart fundamental knowledge in handling the equipment / glassware and chemicals in chemistry laboratory
2. The student should be conversant with the principles of volumetric analysis and identification of organic functional groups.
3. To apply various instrumental methods to analyze the chemical compounds and to improve understanding of theoretical concepts.

Course Outcomes

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

The students will learn to:

1. Estimate rate constants of reactions from concentration of reactants/ products as a function of time.
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
3. Synthesize a small drug molecule and Identify the organic compounds.
4. understand importance of analytical instrumentation for different chemical analysis.
5. Perform interdisciplinary research such that the findings benefit the common man.

Chemistry Lab

1. Estimation of temporary and permanent hardness of water using EDTA solution.
2. Estimation of amount of chloride in water.
3. Determination of rate constant for the reaction of hydrolysis of methyl acetate (first order).
4. Estimation of amount of HCl Conductometerically using NaOH solution.

5. Estimation of (a) amount of CH_3COOH Conductometerically using NaOH solution. (b) amount of HCl and CH_3COOH present in the given mixture of acids Conductometerically using NaOH solution.
6. Estimation of amount of HCl Potentiometrically using NaOH solution.
7. Estimation of amount of Fe^{+2} Potentiometrically using $KMnO_4$ solution.
8. Distribution of acetic acid between n-butanol and water.
9. Synthesis of drug - Aspirin.
10. Organic Chemistry- Identification of Functional groups - neutral group (carbonyl groups-acetaldehyde and acetone); acidic group(benzoic acid) ; basic group (aniline).
11. Determination of surface tension of organic solvents (ethanol, ethyl acetate).
12. Determination of Viscosity.

TEXT BOOKS

1. J. Mendham and Thomas ,"Vogel' s text book of quantitative chemical analysis", Pearson education Pvt.Ltd., New Delhi , 6th ed. 2002.

SUGGESTED READINGS

1. Dr. Subdharani , "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing, 2012.
2. S.S. Dara , "A Textbook on experiment and calculation in engineering chemistry", S.Chand and Company, 9th revised edition, 2015.