

**SHANMUGA ARTS,SCIENCE,TECHNOLOGY & RESEARCH ACADEMY
(SASTRA UNIVERSITY)
THIRUMALAISAMUDRAM
THANJAVUR-613401**



**Scheme of Study and syllabi for I Year B.Tech. / M.Tech. (5-Year Integrated) Programmes
(for the students to be admitted from 2015-16 onwards)**

Scheme of Study for I Year B.Tech. / M.Tech. (5-Year Integrated) Programmes

**2015-16
SEMESTER-I**

**Common to
BCE/BME/BMT/BCS/BIT/BAS/MST/MCM/MAM/MAU/
BEE/BEC/BEI/BIC/BBT/BBE/BI/BCH/MPS/MCS/MIC/MNN/MBI/MBT/MCH**

Sl.No	Code No	Subject	Period Per week			Credit
			L	T	P	C
1	CEN101R03	English Grammar and Composition/ classical language/Foreign language	2	1	--	3
2	CMA102/102R01	Engineering Mathematics – I	3	1	--	4
3	CCS103R02	Programming in C	3	1	--	4
4	CPY104R01/104R02 CCM104R01/104R02	Engineering Physics/ Engineering Chemistry	3/3	1/1--	--	4/4
5	CCE105R01/ CCE105/105R01	Engineering Mechanics/ Engineering Drawing	3/1	1/0	0/4	4/3
6	CCE106/106R01 CEE106/106R01	Basic Civil Engineering/ Electrical Sciences	2/3	--	--	2/3
7	CME107/ CCE107/107R01	Basic Mechanical Engineering/ Environmental Studies	2/2	--	0/0	2/2
8	CCS108/108R01	Programming in C Lab	--	--	2	1
9	CPY109R01/ CCM109/	Engineering Physics Lab/ Engineering Chemistry Lab	--	--	2/2	1/1
10	CME110/ CCE110/	Engineering practice/ Computer Aided Drawing Lab	--	--	2/2	1/1
11	CEN111/	Indian culture and ethics	1/0	--	--	1/0
Total			19/17	5/4	6/10	27/26

SEMESTER-II

Sl.No	Code No	Subject	Period Per week			Credit
			L	T	P	C
1	CEN201R02	Technical Communication	2	1	--	3
2	CMA202/202R01	Engineering Mathematics – II	3	1	--	4
3	CCS203/203R01	Programming in C++	3	1	--	4
4	CCM204R01/204R02	Engineering Chemistry/	3/3	1/1-	--	4/4
	CPY204R01/204R02	Engineering Physics				
5	CCE205/205R01	Engineering Drawing/	1/3	0/1	4/0	¾
	CCE205/205R01	Engineering Mechanics				
6	CEE206/206R01	Electrical Sciences/	3/2	--	--	3/2
	CCE206/206R01	Basic Civil Engineering				
7	CCE207/207R01/ 207R02	Environmental Studies/	2/2	--	--	2/2
	CME207	Basic Mechanical Engineering				
8	CCS208/208R01	Programming in C ⁺⁺ Lab	--	--	2	1
9	CCM209	Engineering Chemistry Lab/	--	--	2/2	1/1
	CPY209R01	Engineering Physics Lab				
10	CCE210	Computer Aided Drawing Lab/	--	--	2/2	1/1
	CME210	Engineering Practice				
11	CEN211	Indian Culture and Ethics	0/1	--	--	0/1
Total			17/19	4/5	10/6	26/27

SASTRA University
Department of English, School of Humanities and Sciences

I Semester - B.Tech. / M.Tech. (5 – Year Integrated) Programmes
English Grammar and Composition

L	T	P	C
2	1	0	3

Course Code:

BCECEN101R03 / BCHCEN101R03 / BCSCEN101R03 / BECCEN101R03 / BEECEN101R03 / BEICEN101R03 / BMECEN101R03 / BBECEN101R03 / BMTCCEN101R03 / BBICEN101R03 / BITCCEN101R03 / BICCCEN101R03 / BBTCCEN101R01 / BASCCEN101R01 / MNCCEN101R03 / MCMCCEN101R02 / MSTCCEN101R02 / MAUCEN101R02 / MAMCCEN101R02 / MCSCEN101R02 / MPSCEN101R02 / MICCCEN101R02 / MCHCCEN101R01 / MBICEN101R01 / MBTCCEN101R01

Course Description: This is a practical course in 'English Grammar and Composition' meant to bridge the gap between school English and university English, focusing on the why of grammar and communication. More importantly, the course will help learners to develop the communicative spirit, which will make their learning interesting and performance purposeful.

Course Objectives: By the end of the course, the learners will be able to write not only simple and grammatically correct sentences (in English) but also write coherent discourses like, for example, essays and letters. They will also be able to self-correct errors, if any, in compositions, their own or others'.

Unit I: Grammar

10 PERIODS

1. Vocabulary: word formation: Compound words, prefixes, suffixes, words that are confused, synonyms and antonyms.
2. Parts of Speech
3. Nouns: countable and uncountable
4. Degrees of Comparison
5. Articles
6. Verbs: Transitive and Intransitive, Tenses & Tense sequences, Conjugation of Verbs, Phrasal verbs.
7. Active and Passive Voice
8. Auxiliaries and Modals – be, have, do, can, could, may, might, shall, should, will, would, must & ought to
9. Prepositions
10. Types of Sentences: declarative/assertive, interrogative, imperative and exclamatory
11. Sentence Structures: Subject and Predicate; Sentence Structure SV/SVC/SVO/SVIODO/SVOA
12. Phrase and Clause

Unit II: Basics of Writing

10 PERIODS

13. Sentences: Simple, Compound and Complex

14. Interchange of Affirmative and Negative Sentences
15. Direct and Indirect Speech
16. Agreement: Subject and Verb; Agreement: Noun and Pronoun
17. Word order
18. Punctuation
19. Conjunctions
20. Cohesion and coherence
21. Common errors in English

Unit III: Paragraph Writing

5 PERIODS

Principles of paragraph structure: unity, order, variety; writing of a paragraph with a topic sentence and supporting details; expansion of ideas into paragraphs; writing of the introductory paragraph, body paragraph and concluding paragraph.

Unit IV: Essay Writing

5 PERIODS

Characteristics of a good essay; classification of essays – narrative, descriptive, expository, imaginative.

Writing an essay: The process: brainstorming / mind mapping, writing an outline, writing the Introduction, Body and Conclusion, revising, (checking coherence, grammar & cohesion).

Unit V: Letter Writing

15 PERIODS

Form of Letters; Classification of Letters: formal and informal; Model letters on real-life situations for classroom teaching and practice.

Reference books:

1. Krishnaswamy, N.. 2000. Modern English: A book of grammar, usage and composition review. Chennai: Macmillan.
2. Murphy, Raymond. 2007. Intermediate English Grammar. New Delhi: Cambridge University Press.
3. Wren & Martin. High School English Grammar and Composition. (Revised edn.) New Delhi: Chand & Co
4. Department of English, SRC, SASTRA University. 2013. A Handbook of Remedial Grammar for UG Students. SASTRA Publication.
5. Department of English, SASTRA University. 2013. Strategies in Communication. SASTRA Publication.
6. Margaret McCarthy. Letter Writing Made Easy – Featuring sample letters for hundreds of common occasions. New Delhi: Jaico Publishing House

Learning outcome:

By the end of the course, the learner will be able to:

Unit I	Write simple and grammatically correct sentences
Unit II	Understand the importance of cohesion and coherence in writing
Unit III	Develop structured paragraphs with unity, order and variety
Unit IV	Write good essays with an understanding of the process and structure
Unit V	Write letters both formal and informal, following the conventions

SASTRA UNIVERSITY, THANJAVUR
DEPARTMENT OF ORIENTAL STUDIES AND RESEARCH
SANSKRIT – SPOKEN & WRITTEN
SYLLABUS

45 PERIODS

Course Code:

BCECOSB01/BMECOSB01//BMTCOSB01/BCSCOSB01/BITCOSB01/BASCOSB01/MSTC
OSB01/MCMCOSB01/MAMCOSB01/MAUCOSB01/BEECOSB01/BECCOSB01/BEICOSB0
1/BICCOSB01/BBTCOSB01/BBECOSB01/BBICOSB01/BCHCOSB01/MPSCOSB01/MCSCO
SB01/MICCOSB01/MNNCOSB01/MBICOSB01/MBTCOSB01/MCHCOSB01

COURSE OBJECTIVES:

Sanskrit was the cultural language of India from time-immemorial. It flows in the life blood of every Indian. To preserve our moorings, to bridge the ancient and the modern, to unravel the knowledge contained in the Ancient texts, to protect our Intellectual Property Rights and to explore new avenues of innovations, a study of Sanskrit is essential.

SASTRA University will be promoting the study of Sanskrit as a means of preserving and popularizing the best thought of culture of India by introducing “Sanskrit – spoken and written” to the I year Engineering students.

UNIT: I

10 PERIODS

Spoken Sanskrit – Self introduction – Introducing names of things –Verbs with actions – Application of Case endings with Visual representation and Charts – Telling a story in Present tense – Future and Past tense – Usage of Pratyayas in sentences.

UNIT: II

9 PERIODS

Alphabhets, Words in three Genders, three Numbers and Persons, Case endings, Pronoun forms, Verbal terminations and Verbal forms Present tense. Construction of simple Sentences (Sanskrita Sri Pathamala Vol.I ... 1-15 lessons)

UNIT: III

9 PERIODS

Application of Case endings in sentences – Prepositions – Difference between Masculine, Feminine and Neuter gender words – Imperative and Potential Mood - Translation Practices (Sanskrita Sri Pathamala Vol.I ... 16-31 lessons)

UNIT: IV**9 PERIODS**

Introduction to Masculine, Feminine and Neuter gender 'sabda'-s with different endings – Verbal forms Past tense – Adjectives – Numbers 1 to 100 – Indeclinables – Upasargas and Pratyayas – Verbal forms Future tense – List of simple Verbs with meanings – Wise Sayings (Sanskrita Sri Pathamala II 1-30 lessons)

UNIT: V**8 PERIODS**

Narrating the Story of Ramayana according to Ramakatha (Slokas 1-70)

Books:

1. Samskrita Sri Pathamala , Vol.I 3rd Edition , 2012, Published by Samskrit Education Society, St.Mary's Road, R.A.Puram, Chennai – 600 028.
2. Samskrita Sri Pathamala , Vol.II 12th Edition , 2008, Published by Samskrit Education Society, St.Mary's Road, R.A.Puram, Chennai – 600 028.
3. Ramakatha, Published by Samskrita Bhasa Pracharini Sabha, Chittoor (AP), Edition 2012.

Learning outcome:

By the end of the course, the learner will be able to:

Unit I	Converse with simple Sanskrit sentences.
Unit II	Read, write & understand simple Sanskrit sentences .
Unit III	Translating English into Sanskrit & Vice versa.
Unit IV	Read, write & understand simple Sanskrit stories & passages .
Unit V	Know the greatness of our rich heritage and to inculcate good habits & qualities.

JAPANESE SPOKEN LANGUAGE

L	T	P	C
2	1	0	3

COURSE CODE:

BCECOSB02/BMECOSB02/BMTCOSB02/BCSCOSB02/BITCOSB02/BASCOSB02/MSTCOSB02/MCMCOSB02/MAMCOSB02/MAUCOSB02/BEECOSB02/BECCOSB02/BEICOSB02/BICCOSB02/BBTCOSB02/BBECOSB02/BBICOSB02/BCHCOSB02/MPSCOSB02/MCSCOSB02/MICCOSB02/MNNCOSB02/MBICOSB02/MBTCOSB02/MCHCOSB02.

Course Objectives:

The Japanese course is aimed to prepare the students those who do not have basic knowledge of the same and to develop an ability to use the language effectively for practical communication. The course is ideal of basic four skills i.e. speaking, listening, reading and writing in Roman Japanese.

Unit I: Introduction to Japanese Alphabets

11 PERIODS

(Romaji) Vowels and Long Vowels, Consonants, and Double Consonants, Pronunciation –
Greetings- Relationship of family (look and learn) –Introduce oneself -**Video Classes**

Unit II: Basic structure of sentences

11 PERIODS

(Subject + Object+ Verb) Interrogatives sentence - Classification of verbs – ‘be’ verb (Present and Present negative) - Polite form of verbs Japanese numerals. *Parts of body (look and learn)- Name of the things you carry (look and learn)*– At Post Office - Video Classes

Unit III: Demonstrative Pronouns

11PERIODS

Classification of Particles (Subject - Location Marker - Indirect object Marker To/Towards) - Classification of verb (living things and Non-living things Present and Past tense and Negative) *Days/ Months /Year/Week / Time expressions - Nation and Nationality- Language - Color- At the departmental store-* Historical place-Thanjavur- Video Classes.

Unit IV: Classification of Particles

12 PERIODS

(Direct object marker Sentence final Particle -Possessive form From - To Question words) Classification of Adjectivesand adverbial form, Question words Classification of verbs Present, Present negative, Past and past negative - *Duration and PERIODS Japanese Numerals Counters –Object Floor,-person,-animal -At the Railway /Bus station - At the hospital (Byoki)-Video Classes.*

Reference Books

- 1.KISO-1
2. KyôkashoNihongo–S&N Hayakawa Enterprises Private Ltd - Chennai
3. Learn Japanese-Institute of Asian Studies. Chemmancerry - Chennai
4. A Dictionary of Basic Japanese Grammar - The Japan Times

Learning Outcome:

Unit I	Students will be able to understand the fundamental of grammar and how it differs from the western languages
Unit II	Student will form a basic sentences in japanese and will be able to answer the topic within the classroom
Unit III	Student will be able to read (Roman Script) and understand typical expressions and sentences.
Unit IV	Students will be able to Read, listen,speak and comprehend conversations about topics regularly happenings in daily life situations and able to write short conversations in (Roman) Japanese.

ENGINEERING MATHEMATICS – I
(COMMON FOR ALL BRANCHES OF ENGINEERING)

L	P	T	C
3	1	0	4

COURSE CODE:

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU/BEE/BEC/BEI/BIC/BBT/BBE/BBI/BCH/
MPS/MCS/MIC/MNN CMA102R01

BAS/MBI/MBT/MCH CMA102

Course Objectives:

To help the learner in understanding various mathematical techniques in trigonometry, calculus, maxima - minima of two variables and theory of equations.

UNIT I: Trigonometry

15 PERIODS

Expansions of $\sin n$ and $\cos n$ in powers of \sin and \cos – Expansions of \sin^n and \cos^n in terms of sines and cosines of multiples of – Hyperbolic and Inverse hyperbolic functions – Logarithm of complex numbers – separation of complex functions into real and imaginary parts – simple problems.

UNIT – II : Theory of equations & Algebra

15 PERIODS

Theory of Equations : Introduction – surds and irrational roots – simple problems – equations whose roots are in A.P, G.P and in H.P – Relations between the roots and coefficients – Symmetric functions – Formation of equations – Decreasing and Increasing the roots – Transformation of equations – Reciprocal equations – Descartes's rule of Signs.

Algebra: Binomial, Exponential and Logarithmic Series (without proof) – Problems on summation, coefficient and approximations.

UNIT III – Differential Calculus and Functions of Several Variables

15 PERIODS

Differential Calculus: The n th derivative of a function – Leibnitz theorem – Simple problems. Curvature of a curve – Radius of Curvature (Cartesian, Polar, Parametric and Implicit form) – Evolutes – Involutives – Envelopes (one parameter and two parameter) – Evolute as the envelope of normals.

Functions of several variables: Maxima and Minima of functions of two variables (proofs of theorems are not included) – Constrained Maxima and Minima – Lagrange's method of multipliers.

UNIT – IV: Improper and Multiple Integrals

15 PERIODS

Improper Integrals : Concept of improper integrals with examples – Definition of Beta and Gamma integrals – Relation between them – Properties of Beta and Gamma integrals with proofs – Evaluation of definite integrals in terms of Beta and Gamma integrals – Simple applications (evaluation of double and triple integrals).

Multiple Integrals: Double Integrals – Evaluations – Change of order of integration –

Triple integrals (problems involving Jacobians are not included) – Simple applications .

Text Book:

Engineering Mathematics I, SASTRA University Publications, (Revised Edition 2014)

Reference Books:

1. Engineering Mathematics for first year, T. VEERARAJAN, 5TH Edition, Tata McGraw Hill, 2006
2. Advanced Engineering Mathematics, Erwin Kreyszig, 8th Edition, John Wiley and Sons (ASIA) Pvt limited 2003.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=122101003>
2. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=122104017>

LEARNING OUTCOMES

Unit I	The learner will be capable of handling trigonometric functions in various fields of Engineering. In particular, in the calculation of angles and elevations for construction and other building projects.
Unit II	The learner will be able to solve higher degree equations and to transform equations from one form to another.
Unit III	The learner will have basic knowledge in calculus, with focus in evolutes and envelopes appearing in engineering courses such as Mechanics and Engineering drawing. The learner will also be able to handle functions of more than one variable, along with differentiation under integral sign.
Unit IV	The learner will have an understanding of evaluating multiple integrals that frequently occur in Engineering problems.

NPTEL LINKS:

<http://nptel.ac.in/courses/106104128>

<http://nptel.ac.in/courses/106102066>

PROGRAMMING IN C

Course code:

BCE/BCH/BCS/BEC/BEE/BEI/BME/BMT/BIC/BIT/BBE/BBI/MNN/MIC/MCS/MST/MPS/MCM/MA
M/MAUCCS103R02

BBT/BAS/MBI/MCH/MBTCCS103R01

L	T	P	C
3	1	0	4

Course objective: To understand the design of programming and develop the problem solving

Unit I: Introduction to C Programming

12 PERIODS

Overview of Programming Languages – **Introduction to C:** Introduction, Structure of a C Program – Writing a C Program, Files Used in a C Program , compiling and Executing a C Program, Using Comments, keywords, Identifiers, Basic Data Types, Variables, Constants, Input/output Statements, Programming Examples, Type Conversion and Casting Operators.

Decision Control and Looping Statements – Introduction to Decision Conditional Statements, Conditional Branching Statements, Iterative Statements, Nested loops, Break and Continue Statements, GOTO Statement.

Unit II: Functions

15 PERIODS

Introduction – Using Functions, Function Declaration/Prototype, Function Definition, Function Call, Return Statement, Passing Parameter to a Function, Scope of Variable, Storage Classes, Recursive Functions, Types of Recursion, Towers of Hanoi, Recursion versus Iteration. **Arrays:** Introduction, Array Declaration, Accessing elements of an Array, Storing Values into Arrays, Operations on Arrays - One dimensional Array, Two Dimensional Array – Declaration – Initialization - Inter-function Communication, Multidimensional Arrays, Sparse Matrix. **Applications** – Sorting: Bubble Sort, quick sort. Searching: Linear Search and Binary Search, Stacks and Queues.

Unit III: Strings

15 PERIODS

Introduction, String Operations, String and Character Functions, Array of Strings. **Pointers:** Understanding Computer's Memory, Introduction to Pointers, Declaration of Pointer Variable, Pointer Expressions, Pointer Arithmetic, Null and Generic Pointers, Passing Arguments to functions using Pointers, Pointers and Arrays – Pointers and Strings, Function Pointers, Array of Function Pointers, Pointers to Pointers, Memory Allocation in a C Program, Memory Usage – Dynamic Memory Allocation.

Unit IV: Structures

18 PERIODS

Introduction – Declaration, Initialization, Accessing Structure Members, Operations on Structures, Nested Structures, Array of Structures, Structures and Functions, Self Referential Structures, Union, Array of Union, Union Inside Structures, Enumerated Data types - Declaration, Initialization, Accessing - Using Typedef Keyword.

Files: Introduction to files, Using files in C-Read and Write data from/to files-Detecting End-Of-File Error handling during file operations-Command-Line arguments-Functions for Sequential and Random access-Renaming file, Creating temporary files.

Preprocessor Directives: Introduction-Types of Preprocessor Directives-Conditional Directives.

Text Book:

1. Reema Thareja, "Programming in C", Oxford University Press, New Delhi, 1st Edition, 2011.

Reference Books:

1. Deitel and Deitel, "C How to Program", PHI, Delhi, 7th Edition, 2013.
2. Pradip Dey and Manas Ghosh, "Fundamentals of Computing and Programming in C", Oxford University Press, New Delhi, 2nd Edition, 2013.
3. Brian W. Kernighan and Dennis M. Ritchie, "The C programming Language", PHI, 2nd Edition, 1998.
4. Yashavant.P.Kanetkar, "Let us C", BPB Publications, 13th Edition, 2013.
5. K.N.King, "C Programming – A Modern approach", W.W. Norton Company, London, 2nd Edition, 2008.

LEARNING OUTCOME:

Unit I	The learner will have an understanding of the basic concepts of problem solving aspects, Structure of C and Control, Conditional Statements in C.
Unit II	The learner will have an understanding the concept of Arrays and Functions.
Unit III	The learner will have an understanding the concepts of Strings and Pointers.
Unit IV	The learner will have an understanding the concept of Structures, Command line Arguments, Unions, Pre-processor Statements and Files.

NPTEL LINKS:

<http://nptel.ac.in/courses/106104128>

<http://nptel.ac.in/courses/106102066>

ENGINEERING PHYSICS

Course code:

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU - CPY104R02

BAS – CPY104R01BEC/BEE/BEI/BEI/BBE/BCH/MPS/MCS/MIC/MNN - CPY204R02

BIC/BBT/MBT/MBI /MCH – CPY204R01

L	T	P	C
3	1	0	4

Course Objective: To understand some of the advanced behavior of solids, which includes nanomaterials, superconductors, magnetic and dielectric materials. Also, to understand the basic concepts of spectroscopy, which included LASERS and microscopes.

UNIT I: QUANTUM PHYSICS

15 PERIODS

Break Down of Classical Physics – Planck’s Quantum Theory – Dual Nature of Radiation – Matter Wave : De Broglie Hypothesis – Wave Packet – De Broglie Wavelength- Thomson’s Experiment – Uncertainty Principle – The Wave Function – Time Dependent and Independent Schrödinger Equations – Probability Interpretation of the Wave Function - Particle in One Dimensional Infinite Square Well – Quantum Mechanical Tunneling.

UNIT II: SEMICONDUCTOR AND NANO MATERIALS

15 PERIODS

Semiconductor – Types – Charge Carrier Density in Intrinsic Semiconductor – Conductivity of Semiconductors –Doping of Semiconductors – Carrier Densities in Doped Semiconductors – Fermi Dirac Formalism – Conductivity of Semiconductors - Hall Effect – Experimental Determination of Carrier Concentration and Mobility.Nanomaterials – Classification of Nanomaterials- Synthesis (Chemical Vapour Deposition, Arc-Discharge, Laser Ablation, Sol-Gel and Electrodeposition), Density of States (0D, 1D & 2D Materials) – Properties: Optical (Blue shift), Electrical (Quantum limit of Conductance) and Mechanical (Hardness), and Applications.

UNIT III: MAGNETIC AND DIELECTRIC MATERIALS

15 PERIODS

Magnetic materials - Magnetic dipoles, Dipole moments, Flux density, Susceptibility, Permeability, Bohr magnetron, Classification of magnetic material: Para, Dia and Ferro Magnetism, Weiss theory of Ferromagnetism, Properties of Ferromagnetism, Magnetic domains, Hysteresis Curve, Ferrites: Properties and Applications. Dielectric materials - Electric dipole, Dipole moments, Flux density, Field strength, Dielectric and Polarizability constants: Electronic, Ionic, Orientation Polarizability (definitions only), Local field, Clausius-Mossotti equation, Dielectric loss, Dielectric breakdown, Ferroelectric materials.

UNIT IV: SPECTROSCOPY, LASER AND MICROSCOPY

15 PERIODS

Electromagnetic Spectrum – Atomic Spectra – Rigid Rotator, Simple Harmonic Oscillator - Nuclear Spin behavior (Qualitative treatment), – Electron Spin behavior (Qualitative treatment), Instrumentation: UV – Visible Spectrophotometer and IR Spectrophotometer.

Principle and Characteristics of Laser action – Nd-YAG Laser, CO₂ Laser – Semiconductor diode Laser – Holography – Recording and Reconstructing of Images. Optical Microscope: Magnification, Resolution, Lens formula – Metallurgical Microscope – Electron Microscope – Comparison of Optical and Electron Microscopes - Scanning Electron Microscope – Transmission Electron Microscope

LEARNING OUTCOME:

Unit I	Complete understanding of the necessity for the study of Quantum Mechanics and its applications
Unit II	Complete understanding of the importance of Semiconductors, as well as, Nanomaterials, and their synthesis process and applications.
Unit III	Complete understanding of the basic concepts of magnetic and dielectric materials, and their important properties and applications.
Unit IV	Complete understanding of the basic concepts of electromagnetic spectrum, which includes LASER, NMR, ESR and the working principles of their spectrophotometers and some microscopes.

Text Books:

1. A. Marikani – Engineering Physics, PHI Learning Pvt Ltd., 2009
2. G. Vijaykumari- Engineering Physics, Vikas Publishing Pvt. Ltd. 2nd Edition 2007.

Reference Books:

1. P. M. Mathews and K. Venkatesan, A Text Book of Quantum Mechanics, Tata McGraw Hill, New Delhi, 1987.
2. C. Kittel, Introduction to Solid State Physics (Wiley Eastern, New Delhi, 1977).
3. H.H. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, CBS, Publishers and Distributors, Wadsworth Publishing Company, California, 1988-01.
4. B.B. Laud-Lasers and Non-Linear Optics 2nd Edition Wiley Eastern Limited G. Aruldhass- Engineering Physics, PHI Learning Pvt Ltd. 2010.

NPTEL LINKS:

<http://nptel.ac.in/courses/115102023>

<http://nptel.ac.in/courses/115102026>

<http://nptel.ac.in/courses/118104008>

<http://nptel.ac.in/courses/113104005>

<http://nptel.ac.in/courses/115101005>

<http://nptel.ac.in/courses/115101005>

<http://nptel.ac.in/courses/104103071/2>

<http://nptel.ac.in/syllabus/104106048>

<http://nptel.ac.in/syllabus/115104041>

ENGINEERING MECHANICS

Course code:

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU CCE105R01

BASCCE105

BEE/BEC/BEI/BIC/BBE/BBI/MPS/MCS/MIC/MNN/MCH/MBI/MBT CCE205R01/

BBTCCE205/BCHCCE205R02

L	T	P	C
3	1	0	4

COURSE OBJECTIVE:

The objective of this fundamental course in mechanics is to enhance the analytical and logical problem solving skills of the student. The basic concepts dealt in this course form the cornerstone of advanced topics such as solid mechanics, structural mechanics, fluid mechanics, aero-mechanics, bio-mechanics, machine design and electrical/robotics devices.

UNIT I: EQUILIBRIUM OF PARTICLES

15 PERIODS

Frames of reference- Force Systems – Resolution and addition of forces, resultant of several concurrent forces, Forces in 3D, Equations of equilibrium of particle in 2D and 3D – Lamé's theorem.

UNIT II: EQUILIBRIUM OF RIGID BODIES

15 PERIODS

Moment of a force about a point – moments and couples – Varignon's theorem - equivalent force systems-resultant of non-concurrent force systems – parallel forces. Equations of equilibrium of rigid bodies in 2D and 3D. Applications: Beams – types of supports, loads and reactions. Concept of internal forces. Analysis of pin jointed trusses – Method of sections and joints.

UNIT III: FRICTION

15 PERIODS

Laws of friction – simple contact friction - cone of friction – belt friction – wedge friction – screw jack.

Properties of areas: Centroid of line, area and volume – Composite areas – hollow sections – Center of gravity of regular solids – cone – hemisphere. Second moment of areas – Parallel axis theorem – perpendicular axis theorem. Method of integration for M.I of areas – triangle, circle, semi circle, quadrant of a circle. Composite sections – Tee section, I section, Z section.

UNIT IV: DYNAMICS OF PARTICLES

15 PERIODS

Displacement, velocity and acceleration and their relationship – rectilinear and Curvilinear motion - rectangular components, Tangent and normal acceleration. Motion in a circular path. Newton's laws – Applications. Work energy principle- impulse and momentum principle. Applications.

TEXT BOOKS:

1. Beer.F.P and Johnston.E.R, Vector Mechanics for Engineers – Statics and Dynamics, McGraw Hill International Book Company, 2002.
2. Rajasekaran.S and Sankarasubramanian.G, Fundamental of Engineering Mechanics, Vikas Publishing House Pvt. Ltd., 2008.

REFERENCE BOOKS:

1. Ferdinand.L.Singer, Engineering Mechanics (Statics and Dynamics), Harper Row Publishers.2007.

2. Meriam.J.L and Kraige.L.G, Engineering Mechanics (Statics and Dynamics), John Wiley and Sons.2001.
3. Shames.I.H, Engineering Mechanics (Statics and Dynamics), Prentice – Hall of India- New Delhi,2004.
4. Timoshenko.S.P and Young.D.H, Engineering Mechanics, McGraw Hill Book Co. Ltd.2003.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=122104014>
2. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=122104015>

LEARNING OUTCOMES:

Unit I	The learner will have a clear understanding of the characteristics of forces and its systems, composition and resolution of forces, co-ordinate systems (in plane and in space), and unit vectors in addition to the Newton laws of motion.
Unit II	The learner will be able to understand the concept of particle and rigid equilibrium and to interpret equilibrium in different situations.
Unit III	The learner will be able to analyse the performance of several mechanical devices in which friction plays a central role. In addition, the learners will be able to know the concept of distributed quantities.
Unit IV	The learner gains an exposure to fundamental concepts of kinematics and kinetics.

BASIC CIVIL ENGINEERING

Course code:

BCE/BCS/BIT/BAS/MST/MCMCCE106

BME/BMT/MAM/MAUCCE106R01

BEE/BEC/BEI/BBT/BBE/BBI/MPS/MCS/MIC/MNN/BCH/MCH/MBI/MBT CCE206

BICCCE206R01

L	T	P	C
2	0	0	2

COURSE OBJECTIVE:

To provide an exposure to the learner on the various components of civil engineering like construction materials and techniques, surveying and mechanics of structures.

UNIT I: CIVIL ENGINEERING MATERIALS

8 PERIODS

Branches of Civil Engineering – Civil Engineering materials – stones, Bricks, Steel, Cement, Concrete, Timber and plastics – different types.

UNIT II: SURVEYING

7 PERIODS

Surveying: Types, classification, measurement of distances – angles – determination of areas – Levelling – Simple problems – Total station – Remote Sensing

UNIT III: BUILDING COMPONENTS

8 PERIODS

Foundations – Bearing capacity – Requirement of good foundations – Types, Stone masonry. Brick Masonry – Beams, columns, Lintels, roofing – Flooring – Different types only – Interior design – landscaping.

UNIT IV: MECHANICS AND STRUCTURES

7 PERIODS

Mechanics: Forces, stress, strain, Elasticity – simple problems – Bridges, dams, roads – different types – Railways-permanent way -components. .

TEXT BOOK:

1. M.S. Palanichamy, C. Shanmugham, “Basic Civil Engineering and Basic Mechanical Engineering”, Tata McGraw–Hill Publishing Company Ltd., 2000.

REFERENCE BOOKS:

1. Natarajan. K.V, Basic Civil Engg., Dhanalakshmi Publications, Chennai,2005
2. Ramamrutham, “Basic Civil Engineering”, Dhanpat Rai Publishing Company (P), Ltd., 1999.
3. Satheesh Gopi, “Basic Civil Engineering” Pearson Publications, 2010.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=105104101>
2. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=105107122>
3. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=105102088>

LEARNING OUTCOMES:

Unit I	The learner will have introduction to various branches of Civil Engineering, classification and properties of materials used for construction
Unit II	The learner will learn about fundamentals of surveying and the usage of modern equipments like Total station and remote sensing in surveying.
Unit III	The learner will learn about the principles of construction of simple building components.
Unit IV	The learner will understand concepts of mechanics of materials and structures like dams, bridges, roads and components of railway tracks.

BASIC MECHANICAL ENGINEERING

L	T	P	C
2	--	-	2

Course code:

BCE/BME/BMT/BCS/BIT/BAS/MST/MCM/MAM/MAU CME107

BEE/BEC/BEI/BIC/BBT/BBE/BBI/MPS/MCS/MIC/MNN/BCH/MCH/MBI/MBT CME207

COURSE OBJECTIVE:

Learners can derive a basic knowledge of mechanical engineering principles to realize physical systems, components and processes in both thermal and mechanical systems.

UNIT I: ENERGY RESOURCES AND POWER PLANTS:

8 PERIODS

Conventional and non-conventional energy resources – applications, power plants – steam, hydel, nuclear, gas turbine, combined cycles. Steam boilers – modern high pressure boilers (Babcock & Wilcox boiler, La-MONT boiler and Benson boiler only). Steam turbines – types, operating principle (of Simple impulse, Reaction, Velocity compounding, Pressure compounding and Pressure – velocity compounding).

UNIT II: REFRIGERATION & AIR-CONDITIONING AND I.C. ENGINES:

7 PERIODS

Refrigeration and Air-conditioning – principles of operation of refrigerator (Vapour compression system only) and air-conditioner (Window and Central air conditioning systems). I.C. Engines – types – working principles of 2-stroke (Petrol engine) and 4-stroke engines (Petrol and Diesel engine) – fuel injection systems (Fuel Injection Pump and Injector for Diesel engine & MPFI for Petrol engine) – ignition systems (Battery and Magneto ignition system) – cooling and lubrication systems.

UNIT III: MANUFACTURING TECHNOLOGY (MACHINING AND FORMING):

8 PERIODS

Machining – operations in lathe (turning, facing, knurling, forming, drilling, boring, reaming, counter boring, chamfering and grooving operations only), drilling (drilling, reaming, boring, counter boring, counter sinking, spot facing and tapping operations only) and shaping (shaping horizontal surface, shaping vertical surface, shaping angular surface, shaping slots, grooves & keyways and shaping irregular surface operations only), introduction to CNC machining. Forming – principles of forging – rolling – extrusion – sheet metal forming (blanking, punching & bending) – drawing (Wire drawing only).

UNIT IV: MANUFACTURING TECHNOLOGY (FOUNDRY AND WELDING

7 PERIODS

Foundry process – pattern making (single piece, split pieces and core) – casting (preparation of green sand mould, pouring of molten metal, mould shake out and cleaning). Welding – principles – types (Manual Metal Arc Welding and Oxy-acetylene gas welding).

TEXT BOOK:

1. K. Venugopal and V. Prabu Raja, Basic Mechanical Engineering, Anuradha Publications, 2007.

REFERENCES:

1. T. J. Prabhu, V. Jaiganesh and S. Jebaraj, Basic Mechanical Engineering, SCITECH Publications Ltd., 2001.
2. R.K. Rajput, Thermal Engineering, Lakshmi Publishers, 2010.
3. S.K.Hajra Choudry. Elements of workshop Technology Vol.I&II, Asia Publishing House.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=112107144>
2. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=112108148>
3. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=112104113>

LEARNING OUTCOMES:

Unit 1	Students will understand the various forms of energy sources available, its application for power generation, energy conservation and the components of various types of power plants
Unit 2	Students will learn the basic principles applied in refrigeration and air conditioning systems and identify and understand the components of IC Engine for automobile industry
Unit 3	Students will gain knowledge of the different aspects of manufacturing technology in particular about machining and forming
Unit 4	Student will learn primary manufacturing process such as casting process and metal joining processes for manufacturing industry

PROGRAMMING IN C LABORATORY

L	T	P	C
0	0	2	1

Course code:

BAS/BBT/MBI/MBT/MCHCCS108R01

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU/BEE/BEC/BEI/BIC/BBE/BBI/BCH/MPS/
MCS/MIC/MNNCCS108R01

COURSE OBJECTIVE:

To help the learners understand the underlying features of C language and impart skills in writing programs for solve a variety of problems.

LIST OF EXPERIMENTS:

1. Programs using Input, output and assignment statements
2. Programs using Branching statements
3. Programs using Looping statements
4. Programs using Functions
5. Programs using Arrays
6. Programs using Structures
7. Programs using strings
8. Programs using Pointers (both data pointers and function pointers)
9. Programs using dynamic memory allocation
10. Programs using Recursion
11. Programs using Files
12. Dividing a large program into multiple files

LEARNING OUTCOMES:

Exercise - 1	Students learn how to write simple programs in C by using input and assignment statements.
Exercise – 2	The students will learn to deal with conditional statements and branching.
Exercise – 3	The students will learn to use the loop statements.
Exercise – 4	Learners are exposed to the idea of divide-and-conquer and its benefits. They begin to conceive and practice programs that consist of many functions.
Exercise – 5	The learners will be able combine a group common variables under a single name. The concept of arrays is experimented through sample problems.
Exercise – 6	The learners will gain knowledge about the declaration, definition and usage of structures and the manipulation of structure members.
Exercise – 7	The learners will be able to handle strings in their programs by using character arrays. They start using the string manipulation functions present in the library.
Exercise – 8	The learners will get an idea about memory address, variables and pointers. They will be able to write programs utilizing the concepts of pointers.
Exercise – 9	Learners will be able to enhance their knowledge about pointers by using them for dynamic memory allocation.
Exercise – 10	The learners will understand how to invoke a function from itself by writing recursive calls.
Exercise – 11	The learners will be able to work with files for the creation, opening, deletion, writing and modification of file contents.
Exercise – 12	The learners will gain knowledge to work with multi-file programs through which they may divide a larger program into a number of smaller files.

ENGINEERING PHYSICS LABORATORY

Course code:

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU/BASCPY109R01
BEC/BEE/BEI/BBI/BBE/BCH/MPS/MCS/MIC/MNN/BIC/BBT/MBT/MBI/
MCHCPY209R01

L	T	P	C
0	0	2	1

List of Experiments

1. Spectrometer - Determination of Wavelength using Grating.
2. Measurement of dielectric constant using parallel plate capacitor.
3. Transistor Characteristics - Common Emitter Configuration.
4. Calibration of Ammeter using Potentiometer.
5. Laser Grating - Determination of wavelength of He-Ne Laser.
and Non-Destructive Testing.
6. Hall effect – Measurement of carrier concentration and mobility of semiconductor
7. Thermister – Determination of Band gap.
8. Logic Gates - OR, AND, NOT, NOR and NAND using Discrete Components.
9. Velocity of Ultrasonic waves in Liquids and Compressibility of the liquid using Ultrasonic Interferometer.
10. Four Probe Method – Measurement of Resistivity of material
11. Hysteresis Loop Tracing – BH Curve
12. Electron Spin Resonance Spectrometer.

ENGINEERING PRACTICE

L	T	P	C
0	0	2	1

Course code:

BCE/BME/BMT/BCS/BIT/BAS/MST/MCM/MAM/MAU CME110R01

BEE/BEC/BEI/BIC/BBT/BBE/BBI/MPS/MCS/MIC/MNN/BCH/MCH/MBI/MBT

CME210R01

COURSE OBJECTIVE:

To promote skill and to create hand and eye co-ordination by giving practical training to the students in different fields of Engineering.

LIST OF EXERCISES:

1. Angle Fitting by filing of Steel flats
2. Fabrication of a Tray from G. I sheet
3. Forging of round rod to square Rod
4. Welding of Lap and Butt joints
5. Preparation of Mould cavity
6. Internal combustion Engines
 - (a) Dismantling, study and assembly of I.C. Engines
 - (b) Dismantling, study and assembly automobile gearbox
7. Study of power distribution and domestic electric appliances
 - (a) Design of regulated Power supply
 - (b) Measure of insulation resistance using MEGGER
 - (c) Efficiency of electric kettle
8. Study of domestic wiring of
 - (a) Staircase wiring
 - (b) Fluorescent lamp wiring
 - (c) Ceiling fan wiring
9. Measurement of capacitance and inductance using Maxwell Bridge and Schering Bridge
10. Measurement of amplitude, frequency and phase angle of standard waveforms using Cathode Ray Oscilloscope (CRO) and measurement of Inductance using Wheat Stone Bridge
11. Study Exercises
 - (a) Study & Testing of PC Hardware
 - (b) Study of various bonds using bricks
 - (c) Pipe fittings and fixtures in field
 - (d) Power Supply

LEARNING OUTCOMES:

Fitting	Students will be trained to work in markings on surface plates and using steel punches for locating the marked areas for hack sawing and assembly.
Sheet Metal	The students are capable of acquiring the skill to do exercises in sheet metal work & gain knowledge in development of surfaces.
Forging	The student will learn to work in Hot Forging for converting rods into different shapes.
Welding	The student will learn to work in welding and have practical exposure in metal joining

Foundry	The student will have knowledge on mould preparation, types of patterns, various tools and accessories required for foundry and casting.
I C Engines	Dismantling & assembly of Internal combustion Engines and Dismantling & assembly of Gear Box to have skill & Knowledge in the Fundamentals of Automobiles
Power Distribution And Domestic Electrical Appliances	The student will gain exposure to do simple exercises on designing regulated power supply, and finding insulation resistance using MEGGER along with finding efficiency of electric kettle.
Domestic Wiring	The student will work on domestic wiring exercises and have hands on training in electrical wirings for fluorescent lamp connection, fan working and stair case wiring.
Measurement Of Electrical Components	The student will learn to measure capacitance & inductance, amplitude, frequency and phase angle in circuits
Study Experiments	Demonstration on exercises like computer hardware, brick arrangement, power distribution and types of pipe fittings and joints.

B.Tech. / M.Tech. (5 – Year Integrated) Programmes

INDIAN CULTURE & ETHICS

(Offered to Group A in the First Semester and Group B in the Second Semester)

Course code:

BCE/BME/BMT/BCS/BIT/BAS/MST/MCM/MAM/MAU CME111R01

BEE/BEC/BEI/BIC/BBT/BBE/BBI/MPS/MCS/MIC/MNN/BCH/MCH/MBI/MBT

CME211R01

L	T	P	C
1	0	0	1

Our Cultural Heritage

Dharma: Ethical Values- Truth- Non-violence.

Service – Sacrifice - Love – Universal Brotherhood

Professional Ethics: Honesty, Work Ethics, Duty, Tolerance

Swadharma- Self – knowledge – Self improvement.

The Individual and Society

The Beautiful and the Good

Religion: Need – Universality –Inter- religious understanding

Integral Humanism

References:

1. Radhakrishnan. S. 1973. Our Heritage. New Delhi: Orient Paper Backs.
2. Jawaharlal Nehru. 2010. The Discovery of India: Chapters 3&4. New Delhi: Penguin Books India Ltd.
3. Robinson, Simson. et al. 2007. Engineering, Business & Professional Ethics. Routledge

Learning outcome:

By the end of the course, the learner will be able to understand the rich cultural heritage of India and understand the various ethical values like truth, dharma, service, sacrifice and non-violence. The learner gets the opportunity to understand the universal principles of religion and is exposed to the concept of integral humanism.

II Semester - B.Tech. / M.Tech. (5 – Year Integrated) Programmes

TECHNICAL COMMUNICATION

BCECEN201R02/BMECEN201R02/BMTCEN201R02/BEICEN201R02/BEECEN201R02/
BECCEN201R02/BCICEN201R02/BITCEN201R02/BICCEN201R02/BCHCEN201R02/BBICEN
201R02/BBTCEN201R01/BBECEN201R02/BASCEN201R01
MSTCEN201R02/MCMCEN201R02/MAMCEN201R02/MAUCEN201R02/MICCEN201R02/MPS
CEN201R02/MCSCEN201R02/MCHCEN201R01/MBICEN201R01/MBTCEN201R01/
MNNCEN201R02

L	T	P	C
2	1	0	3

OBJECTIVES

The course focuses on developing the proficiency of B.Tech. students in communication skills specific to their studies and likely demand in their workplace thereafter. At the end of the course learners will be able to use English for all purposes of technical communication – make effective interpersonal interactions, presentations and write various types of reports in appropriate format.

Unit I: General and Technical Communication

6 PERIODS

General Communication: Definition, importance and process; 6Cs of Communication; Maslow's hierarchy of needs.

Technical Communication: Importance of Technical Communication, General and Technical Communication; Uses of technical jargon; The 'you' attitude, Use of positive language; Levels of Communication –Interpersonal/Organizational/Mass; Flow of Communication – Downward/Upward/Horizontal; Technology-based communication.

Unit II: Listening and Speaking

6 PERIODS

Listening: Listening and Note-taking.

Speaking: Awareness of audience, purpose and structure; gathering information; organizing a speech, delivering a speech: presentation strategies, group communication: group discussion, brainstorming, meetings, negotiations, seminars and conferences; interview technique.

Unit III: Reading

10 PERIODS

Reading in order to improve comprehension of written English; reading and identifying main ideas and supporting details; guessing the meaning of new words in context; skimming and scanning, reading critically, inferring and predicting; note-making and-summarizing; interpreting graphics in technical writing.

Reading imaginative texts:

1. Where the mind is without fear – Rabindranath Tagore
2. Stopping by Woods on a Snowy Evening - Robert Frost
3. The World Is Too Much With Us - William Wordsworth
4. All the World's A Stage -William Shakespeare
5. On First Looking into Chapman's Homer - John Keats
6. Ozymandias - Percy Bysshe Shelley

Unit IV: Basics of Writing**8 PERIODS**

Grammatical elements in technical communication: compound nouns, noun phrases, conditional sentences, appropriate use of active and passive voice, tightening rambling sentences with regard to simplicity, clarity and precision.

General Principles of writing; the process and product

Modes of writing – description (process/product), definition, classification, exemplification, comparison/contrast, cause and effect, argumentation etc.

Use of Graphics

Editing, Proofreading, Referencing (APA Style)

Unit V: Technical Writing**15 PERIODS**

Business letters, Memos and Emails: Essential elements; Order placement letters,

Sales letters, enquiry letters, claim letters etc.

Reports: types and structure; feasibility, marketing, progress and project completion report, research or investigative report etc.

Technical Proposals: types and structure

User manuals, fliers, brochures and newsletters

Job search: writing resumes and cover letters

Textbook: Department of English. 2013. Technical communication. SASTRA Publication.

Reference books:

- i. Gerson, Sharon J and Steven M. Gerson. 2007. Technical writing: Process and Product. Delhi: Pearson Prentice Hall.
- ii. Raman, Meenakshi and Sangeetha Sharma. 2013. Technical communication: Principles and practice. Second Edition New Delhi: OUP.
- iii. Rizvi, Ashraf. 2006. Effective technical communication. New Delhi: Tata McGraw Hill Publication Company Ltd.
- iv. Strunk, W., Jr. and White, E.B. Elements of Style.
<http://faculty.washington.edu/heagerty/Courses/b572/public/StrunkWhite.pdf>

Learning outcome:

By the end of the course, the learner will be able to:

Unit I	Learn the nuances of general and technical communication
Unit II	Acquire better listening skill and make effective presentations
Unit III	Read and analyse texts in order to infer/predict meaning
Unit IV	Learn the use of special grammatical elements used in technical writing
Unit V	Write technical documents like user manual, product description, reports and proposals

**BCCMA202/MCCMA202
ENGINEERING MATHEMATICS II**

Course code:

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU/BEE/BEC/BEI/BIC/BBT/BBE/BBI/BCH/
MPS/MCS/MIC/MNN CMA202R01
BAS/MBI/MBT/MCH CMA202

L	T	P	C
3	1	0	4

Course Objectives:

To help the learners in understanding various mathematical techniques in ordinary differential equations, Matrix theory, Vector differentiation and integration and three Dimensional analytical geometry.

UNIT I- Ordinary Differential Equations

15 PERIODS

First order first degree ODEs - Bernoulli's Differential equation – Exact ODEs- First order higher degree ODEs - solvable for p,x,y – Clairaut's form — Application in Electrical circuits – current inductive circuits – capacitance circuits – orthogonal trajectories – solving second and higher order ordinary differential equations with constant coefficients – particular integrals of various functions –Euler's differential equations with variable coefficients – simultaneous differential equations with constant coefficients – method of variation of parameters .

UNIT II- Matrix Algebra

15 PERIODS

Introduction – Inverse of a matrix by elementary transformation –Linear independence and dependence of vectors- Eigen values and Eigen vectors – properties of Eigen values and Eigen vectors with proofs – Cayley Hamilton theorem(without proof) – Finding higher powers and Inverse of the matrix by using Cayley Hamilton theorem – Similarity transformation – Diagonalisation of a matrix by similarity transformation – Orthogonal matrix – Diagonalisation of a matrix by orthogonal reduction – Quadratic Forms – Nature of Quadratic forms – reduction of Quadratic form to Canonical form.

UNIT III - VECTOR CALCULUS

15 PERIODS

Vector differentiation - Gradient , Divergence and Curl – Geometrical and Physical Interpretation(without proof) – Irrotational and Solenoidal vector fields – vector operator identities without proof – Vector integration definition – simple problems on line, surface and volume integrals – Green's theorem , Stoke's theorem and Gauss Divergence theorem (without proof) –verifications and applications.

UNIT IV - ANALYTICAL GEOMETRY OF THREE DIMENSIONS

15 PERIODS

The Plane – Angle between the planes – The Straight Line – Symmetrical form of the equations of a Line – Transformation of the equations of a line from unsymmetrical form to the symmetrical form – Coplanar Lines – Skew Lines – Shortest distance between two lines – The Sphere – Equation of tangent plane to a Sphere at a given point on it – Orthogonal Spheres.

Text Book:

Engineering Mathematics II , Pearson Publications, (Revised Edition 2014)

Reference Books:

1. Engineering Mathematics Volume II, M.K.Venkataraman,National publishing Company ,India 2001.
2. Engineering Mathematics for first year, T.VEERARAJAN,5TH Edition, Tata McGraw Hill, 2006
3. Engineering Mathematics Volume III, P.Kandasamy and others, S.Chand, 2006.
- 4.. Advanced Engineering Mathematics, Erwin Kreyszig, 8th Edition, John Wiley and Sons(ASIA) pvt limited 2003
5. Advanced Calculus , Volume I, S. Arumugam, A.Thangapandi Issac, New Gamma Publishing House,2007
6. Algebra, Narayanan ,T.K.Manicavachagom Pillai, Ganapathy, S.V. Publishers, 2005

LEARNING OUTCOMES

Unit I	The learner will be able to develop methods to solve differential equations that arise from Science / Engineering problems
Unit II	The learner will be able to represent data in matrix form for various matrix operations and proficient in handling various linear algebraic techniques.
Unit III	The learner will be capable of interpreting vector operators geometrically and to handle multiple integrals in physical and engineering problems.
Unit IV	The learner will have knowledge of providing Geometric interpretation for various 3D surfaces by equations.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=122104018>
2. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=122103012>

PROGRAMMING IN C++

Course code:

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU/BEE/BEC/BEI/BIC/BBT
/BBE/BBI/BCH/MPS/MCS/MIC/MNN CCS203R01
BAS/MBI/MBT/MCH CCS203

L	T	P	C
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COURSE OBJECTIVE:

The course is developed to introduce object oriented concepts. Gradually they will be exposed to core concepts like class, object, inheritance, overloading etc, and they can apply it to any real world scenario.

UNIT I:

15 PERIODS

Introduction: Fundamentals of object oriented programming – procedure oriented programming Vs. object oriented programming (OOP), Object oriented programming concepts – Classes, reusability, encapsulation, inheritance, polymorphism, dynamic binding, message passing. C++ Programming Basics: Output Using cout, directives, input with cin, type bool, setw Manipulator, type Conversions.

Functions: returning values from functions, reference arguments, overloaded function, inline function, default arguments, returning by reference..

UNIT II:

15 PERIODS

Object And Classes: Implementation of Class in C++, C++ Objects Vs Physical Object, C++ Object as Data Types, Constructor, Object As Function Arguments, the Default Copy Constructor, returning Object From Function, Structures And Classes, Classes Objects And Memory Static Class Data, Const Data and Classes.

Arrays and String Arrays Fundamentals: Arrays as Class Member Data, Arrays of Object, String, the standard C++ String Class. Operator Overloading: Overloading Unary Operators, Overloading of Binary Operators, Data Conversion, Pitfalls of Operators Overloading and Conversion, Keywords Explicit and Mutable.

UNIT III:

15 PERIODS

Inheritance: Concept of Inheritance, Derived Class And Base Class, Derived Class constructors, Overriding Member Function, Inheritance In The English Distance Class, Class Hierarchies, Inheritance And Graphics Shapes, Public And Private Inheritance, Levels Of Inheritance, Multiple Inheritance, Ambiguity In Multiply Inheritance, Aggregation: Classes Within Classes, Inheritance and program Development.

Pointers: Addresses and pointer, The Address-Of Operator &, Pointer and Arrays, Pointer and Fraction, Pointer And C- Types String.

Memory Management: New And Delete, Pointers to Objects, Debugging pointers.

Virtual Function: Virtual Function, Friend Function, Static Function, Assignment And Copy Initialization, This Pointer, Dynamic Type Information.

UNIT IV:

15 PERIODS

Streams and Files: Streams Classes, Stream Errors. Disk File I/O with Streams, File Pointers, Error Handling in File I/O, File I/O With Member Function, Overloading the Extraction And Insertion Operators, Memory As A Stream Object, Command line Arguments, and Printer Out put.

Templates and Exceptions: Function Templates, Class Templates Exceptions.

Multi file Programming: Reasons for multi-file programming, creating multi-file program, A very long number class, A high rise elevator simulation

TEXT BOOK:

1. Robert Lafore, Object oriented programming in C++ (Third Edition), Galgotiapublishers private limited, New Delhi, 2009.

REFERENCE BOOKS:

1. Mastering C++ by KR Venugopal and Rajkumar, T Ravishankar; Tata McGrawHill Publishing Co. Ltd., New Delhi, 1997.
2. C++: An introduction to programming by Jense Liberty, Tim Keogh: BPB Publications, New Delhi,2001.
3. C++ Premier by Stephen Parata , TMH Publishing Co. Ltd., New Delhi,2000.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=106101006>

LEARNING OUTCOMES:

Unit I	The learner will gain knowledge of the basics of Object Oriented Programming
Unit II	The learner will be taught core concepts like classes and objects.
Unit III	The learner will understand the key features of inheritance and pointers.
Unit IV	The learner will understand the concepts of file and streams with exception handling.

ENGINEERING CHEMISTRY

BCH/BEC/BEE/BEI/BIC/BBT/BBE/BBI/MNN/MIC/MCS/MPSCCM 104R02/

MBI/MCH/MBTCCM104R01/

BCE/BCS/BME/BMT/BIT/MST/MCM/MAM/MAUCCM204R02/

BASCCM204R01

L	T	P	C
3	1	0	4

Course objective: To impart knowledge on the principles and methods involved in the purification of industrial and domestic water and to familiarize the concepts of phase equilibria and thermodynamics. In addition, learners will get knowledge on electrochemical concepts of corrosion, renewable energy sources and some important and modern engineering materials.

UNIT I: WATER TREATMENT

15 PERIODS

WATER TREATMENT : Hardness of water, Complexometric determination of hardness of water – EDTA method, Boiler problems – Scales and sludges, Boiler corrosion, Caustic embrittlement, Priming & foaming; Various internal treatment procedures of boiler water; External treatment methods – Lime–Soda process, Zeolite process, Ion exchange process; Specifications for drinking water, Treatment of water for domestic use, Disinfection methods (bleaching powder, chlorination, ozonation, UV treatment); Desalination of brackish water – Electro dialysis, Reverse osmosis; Water specification for electronic industry - Ultrapure water, Purification methods - Chemical dosing, Membrane and carbon filtration, Waste water treatment – Aeration, Trickling filter, Activated sludge process; Chemical analysis of waste water (chemical oxygen demand, biological oxygen demand).

Numerical problems – Hardness calculation, EDTA method and External treatment methods.

UNIT II: PHASE RULE AND THERMODYNAMICS

15 PERIODS

PHASE RULE: Statement and explanation of terms involved - phase, component and degree of freedom, Condensed phase rule. Application to one component (water system) and two component systems (Ag/Pb system).

THERMODYNAMICS: Terminology - States, surroundings, closed, open and isolated system, Adiabatic, Isothermal and isobaric process. Reversible and irreversible process. State function and internal energy. Zeroth law, 1st law and its limitations, 2nd and 3rd law of thermodynamics. Enthalpy, entropy and free energy change. Heat of formation and combustion.

Numerical problems – Degrees of freedom (Phase rule), Free energy, Enthalpy, Entropy, Heat of formation and combustion.

UNIT III: ELECTROCHEMISTRY, CORROSION AND ENERGY SOURCES 15 EPIRODS

CORROSION, AND CORROSION CONTROL: Electrode potentials, Galvanic cells and electrolytic cells, Concentration cells, Reversible and irreversible cells. Nernst equation, Electrochemical series and its applications. Chemical and electrochemical corrosion, factors influencing corrosion, Mechanism of rusting of iron in acid, neutral and alkaline environments. Anodic and cathodic protection, corrosion inhibitors, importance of selection of materials and design of structural patterns in corrosion control.

BATTERIES – Primary batteries (Alkaline batteries) & secondary batteries (Pb/acid, nickel/cadmium and lithium batteries).

NON-CONVENTIONAL ENERGY SOURCES: Solar energy - water heaters, wind energy, fuel cells – H₂-O₂ fuel cell. Nuclear energy – fission and fusion reactions and light water nuclear reactor for power generation.

Numerical problems – Galvanic cell, Electrochemical series and its application.

Unit IV: ENGINEERING MATERIALS 15 PERIODS

HIGH POLYMERS: Monomers and their functionality, Nomenclature of polymers, Classification of polymers; Degree of polymerization; Types of polymerization – addition, condensation and coordination polymerization (mechanism not required). Plastics, compounding of plastics; Fabrication techniques – compression, injection and transfer molding; Preparation, properties and uses of some thermoplastic (PET, nylons and kevlar) and thermosetting plastics (polyurethanes, silicones and alkyd resins). Foamed, reinforced and conducting polymers. Biodegradable polymers - polyglycolic acid and poly lactic acid.

ABRASIVES – Natural and synthetic abrasives – quartz, diamond, silicon carbide and boron carbide.

LUBRICANTS – Classifications, properties - viscosity index, flash and fire points, cloud and pour points.

NANOMATERIALS : Chemical synthesis - wet reduction (Ag, Au), sol-gel method (TiO₂) precipitation method (hydroxyapatite, Ca₅(PO₄)₃(OH)), Self-assembly (DNA-directed self-assembly of AuNPs), Applications of materials (medical field - AuNPs based anti-cancer agents, FeCo and FePt NPs as MRI contrast agents, electronic industry - ZnO & Fe₃O₄ based memristors, ZnO/PbS based quantum dot solar cells, cosmetics - C₆₀ in cosmetics, water purification using AgNPs, construction engineering - TiO₂ based self-cleaning glass).

Numerical problems - Degree of polymerization.

Text book :

1. R.Gopalan, D.Venkappayya and Sulochana Nagarajan, "A Textbook of Engineering Chemistry", Vikas Publishing House, New Delhi, 4th edition (2013)

Reference Books:

1. J.C. Kuriacose and J. Rajaraman, "Chemistry in Engineering & Technology", Vol I & II. Tata McGraw Hill Publishing Company, New Delhi (1984)
2. C.N.R. Rao, A. Muller, A.K. Cheetam, "The Chemistry of Nanomaterials: Synthesis, Properties and Applications, Wiley-VCH Verlag GmbH (2004)

LEARNING OUTCOME:

Unit I	The learner will have a knowledge of water quality management
Unit II	The learner will be conversant with the thermodynamic concepts and the principles of phase equilibria
Unit III	The learner will have an understanding about the corrosion concepts & their control measures. In addition they will have a knowledge of storage batteries and the significance of various non conventional energy sources and their merits
Unit IV	The student will have an adequate knowledge on the uses of engineering materials with due emphasis on polymers, abrasives, lubricants and nanomaterials

ENGINEERING DRAWING

L	T	P	C
1	-	4	3

Course code:

BEE/BEC/BEI/BBT/BBE/BBI/MPS/MCS/MIC/MNN/MBI/MBT CCE105R01
BIC/MCH CCE105R02/BCHCCE105R03
BCE/BCS/BME/BMT/BIT/BAS/MST/MCM/MAM/MAU CCE205R01

COURSE OBJECTIVE:

To help the learners understand the the basic principles of Engineering Drawing and to develop the ability to visualize and draw an object with physical and dimensional configuration

UNIT I: BASICS OF ENGINEERING DRAWING AND CURVES

10 PERIODS

Importance of drawing in engineering applications – Use of drafting instruments – BIS specifications – lettering and dimensioning – Geometric construction – Conic sections: ellipse, parabola and hyperbola. Cycloids-epicycloids and hypocycloid. Involutess- triangle, square and circle.

UNIT II: PROJECTION OF POINTS, LINES AND SOLIDS

15 PERIODS

General principles of orthographic projections – First angle projection – projection of points located in all quadrants – projection of straight lines located in the first quadrant: determination of true lengths and true inclinations – Projections of Solids-prisms, pyramids, cylinders and cones (Truncated solids not included) – change of position method and change of reference line method.

UNIT III: SECTION OF SOLIDS AND DEVELOPMENT OF LATERAL SURFACES 10 PERIODS

Section of solids- true shape of sections – development of lateral surfaces of solids- prisms, pyramids, cylinders and cones.

UNIT IV: ISOMETRIC PROJECTION AND BUILDING DRAWING

10 PERIODS

Principles of Isometric projection – Isometric projections of simple and truncated solids, prisms, cylinders and cones. Introduction to building drawing: simple problem on residential buildings (up to three rooms).

TEXT BOOKS:

1. K.Venugopal, "Engineering Drawing", New Age International (P) Limited, 2010
2. K.V.Natarajan, "A text book of Engineering Drawing Graphics", Dhanalakshmi Publishers, Chennai, 2008.
- 3.

REFERENCE BOOKS:

1. K.R.Gopalakrishna, "Engineering Drawing", (Vol I & II) Subas Publications, 2008.
2. N.D.Bhatt, "Engineering Drawing", Charotar Publishing house, 2003.
3. Dhananjay AJolhe, Engineering Graphics, McGraw-Hill Publishing Company, Ltd, 2009.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=107103002>
2. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=107106009>

LEARNING OUTCOMES:

Unit I	The learner will be able to draw plane curves and special curves which are of great importance to engineers.
Unit II	The learner will be able to understand the principle of Orthographic projection and able to draw the projections of solids in various positions in the first quadrant.
Unit III	The learner will be able to draw sectional views of the solids and development of surfaces of solids like cubes, prisms, cylinders, pyramids, cones and spheres.
Unit IV	The learner will have an understanding of the principles involved in Isometric projection and they will be able to draw accurate 3 –D Isometric projection of solids .In addition, the learner will be able to draw Plan, Elevation and section of a residential building.

ELECTRICAL SCIENCES

L	T	P	C
3	0	0	3

Course code:

BEE/BEC/BEI/BIC/BBT/BCH/MPS/MCS/MIC/MBI/MBT/MCH CEE106

BBE/BBI/MNN CEE106R01

BCS/BIT/BAS CEE206

BCE/BME/BMT/MST/MCM/MAM/MAU CEE206R01

COURSE OBJECTIVE:

To impart a sound understanding of the principles of electrical, electronics and communication engineering with an emphasis on concepts and quantitative approach.

UNIT I: DC CIRCUITS

15 PERIODS

Definition and units of voltage, current, potential difference, power, energy, resistance, conductance, resistivity- Ohm's law-Kirchhoff's law- series circuits-parallel circuits-series parallel circuits-simple problems on Ohm's law and series parallel circuits-Mesh and Nodal analysis-simple problems.

AC fundamentals: Concepts of ac-Definition of terms, cycle, frequency, time period, amplitude, instantaneous value, average value, RMS value, maximum value, form factor and peak factor.

Magnetic circuits: Definition of magneto motive force (MMF), flux and reluctance-analysis of simple series (compound) magnetic circuits-problems. Leakage coefficient- comparison between electric and magnetic circuits. Faraday's law of electromagnetic induction-Lenz's law-statically and dynamically induced EMF-self and mutually inductances-energy stored in the magnetic field of an inductor-force on a current carrying element in a magnetic field- Fleming right and left hand rules-simple problems.

UNIT II: BASIC ELECTRONIC DEVICES

10 PERIODS

Semi conductor P-N junction diode- working principle-V-I Characteristics, zener diode –zener breakdown - V-I characteristics, Bipolar junction transistor- Modes of operation-input, output characteristics, Junction Field Effect transistor- working principle- drain and transfer characteristics, Special diodes- varactor diode, Photo diode, Schottky diode, tunnel diode

UNIT III: UNIT AND SYSTEMS

10 PERIODS

Basic Need for measurement of physical quantities, units for measurement, systems of units-SI: fundamental and derived units.

Measurement of Parameters: Different methods of measuring low, medium and high resistances, measurement of inductance & capacitance with the help of AC Bridges, Q Meter.

Cathode Ray Oscilloscope: Basic CRO circuit (Block Diagram), Cathode ray tube (CRT) & its components , application of CRO in measurement , Measurement of phase difference and frequency of a sinusoidal ac voltage, Lissajous Pattern, Dual Trace & Dual Beam Oscilloscopes.

UNIT IV: COMMUNICATION

10 PERIODS

Signals – analog and digital – need for modulation – amplitude modulation, frequency modulation-Phase modulation - pulse modulation techniques-Digital modulation ASK, FSK, PSK MODEM

(Block diagram approach): Radio, TV, Picture tube- television camera and scanning- TV signal transmission- micro wave system- satellite communication - fibre optic communication- ISDN

REFERENCE BOOKS:

1. B.L.Theraja, Fundamentals of Electrical and Electronics Engineering, S.Chand & Co., New Delhi, 1997
2. K.A.Muraleedharan & R.Muthusubramanian, Basic Electrical, Electronics and computer engineering, Tata McGraw-Hill 1997.
3. W.D.Cooper and A.D.Helfrick, Electronic Instrumentation and measurement techniques - Third edition, Prentice Hall of India, 1991.
4. G. Kennedy, Electronic Communication Systems, McGraw Hill, 1984.
5. Anokh Singh, A K Chhabra, Principles of communication Engineering, S. Chand Publications, 3 rd Rev.edition. 1991.
6. R.S.Sedha Text book of applied electronics, Chand & Co.Ltd., 1987.

NPTEL LINKS:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=122104013>

LEARNING OUTCOMES:

Unit I	The learner will have an understanding of basic concepts of DC & AC circuits and magnetic circuits
Unit II	The learner will be able to understand the principle of operation and the characteristics of various electronic devices.
Unit III	The learner will have an understanding of the measurements of circuit parameters. In addition the learner will be able to apply CRO for the measurement of electrical parameters.
Unit IV	The learner will be able to understand the basic concepts of various modulation techniques and communication systems.

ENVIRONMENTAL STUDIES

L	T	P	C
2	0	0	2

Course code:

BIC/BBT/BBE/BBI/BCH/MNN/MBI/MBT/.MCH CCE107R01
BEE/BEC/BEI/MPS/MCS/MIC CCE107R02

BME/BMT/BAS/MAM/MAU CCE207R01
BCS/BIT CCE207R02
BCE/MST/MCM CCE207R03

Course Objective:

This course aims to introduce the student to the interdisciplinary study of environmental issues in the science and humanities. The main object of this study is, to understand the central role that human environmental perceptions have played and continue to play in the creation of both sustainable and unsustainable relations with nature. It creates environmental awareness amongst the students.

Unit I Introduction and Natural Resources

8 Periods

Natural Resources: Renewable and non-renewable resources – Associated problems – Forest Resources – mineral resources – water resources - Food resources - Energy resources(Renewable and non-renewable) - Land resources - Role of intellectuals in conservation of natural resources .

Unit II Eco-systems and Biodiversity

8 Periods

Eco-systems: Concept of an ecosystem - Structure of an ecosystems – how they work (ecosystem) Elements in living and non-living systems – Energy laws biotic structure – Bio diversity & importance – Conservation of Bio diversity categories of organisms, feeding and non-feeding relationship — Nutrient cycles.

Unit III Environmental Pollution

7 Periods

Pollution – Air pollution and their impact – primary and secondary pollutants – control strategies – Indoor pollutants – global warming – International Treaties.

Unit IV Social Issues and the Environment

7 Periods

Human Population and the Environment: Population growth, variation among nations - Women and Child Welfare – Global Atmospheric changes - Public awareness.

Field Work**15 Periods**

A guided field visit to one of the following natural ecosystem. Visit to a local area to document environmental assets –river / forest / grassland / hill / mountain - Visit to a local polluted site – Urban / Rural / Industrial / Agricultural - Study of common plants, insects, birds - Study of simple ecosystems – pond, river, hill slopes, etc.

Text Books:

1. A Hand Book of Environmental Studies UG Course Material - Compiled by Faculty of School of Civil Engineering, SASTRA University, 2004.
2. Bharucha Erach, Textbook of Environmental Studies for Undergraduate Courses, University Grant Commission, University Press, 2005.
3. Sharma, P. D., Ecology and Environment, Rastogi Publications, New Delhi, 2009.
4. Kaushik, A and Kaushik, C. P., Environmental Science and Engineering, New Age International Pvt. Ltd., 2008.

References:

1. Anjaneyulu, Y., Introduction to Environmental Science, BS Publications, Hyderabad, 2004.
2. Daniel B, Botkin et. Al., Environmental Science, John Wiley & Sons, 2000.
3. Meenakshi, P., Elements of Environmental Science and Engineering, Prentice Hall of India, New Delhi, 2006.
4. William P, Cunnigham, et. al., Principles of Environmental Science, Tata McGraw Hill Edition, 2002.

LEARNING OUTCOMES

Unit 1	The learner will understand the importance, causes, effect and remedial measures of various natural resources.
Unit II	The learner will learn the rich biological wealth of our country, threats to it and various conservation methods.
Unit III	The learner will have the understanding of the causes, effects and remedial measures of different types of environmental pollution.
Unit IV	The learner will learn the various social issues and their link to environments and the role of modern technology for better environmental management and improvement in human health.

PROGRAMMING IN C++ LABORATORY

Course code:

BCE/BME/BMT/BCS/BIT/MST/MCM/MAM/MAU/BEE/BEC/BEI/BIC/BBT
/BBE/BBI/BCH/MPS/MCS/MIC/MNN CCS208R02
BAS/MBI/MBT/MCH CCS208R01

L	T	P	C
0	0	2	1

Course Objective: To help the learners understand the underlying concepts of C++ language and to develop programs for various real time problems and computations.

List of Exercises

1. Programs using Branching
2. Programs using Multi Dimensional Array
3. Programs using Function Overloading and Inline Functions
4. Programs using Classes and Objects (Array as Data Member and Array of Objects)
5. Programs using Constructors and Destructor
6. Programs using 'String' class
7. Programs using Operator Overloading
8. Programs for Data Conversion using Overloading
9. Programs using Inheritance
10. Programs using Virtual Functions and Friend Functions
11. Programs using Templates
12. Programs using Files
13. Dividing Large Program into Multiple Files

LEARNING OUTCOMES

Exercise 1	Learners understand the usages of branching statements by implementing sample programs.
Exercise 2	The learners gain exposure in work with multidimensional arrays with various applications.
Exercise 3	The students learn concepts of function overloading by differing number and types of parameters and the use of inline functions.
Exercise 4	Learners experiment with classes and objects through simple applications.
Exercise 5	The learners will be able to do various programs using constructors and destructors.
Exercise 6	The learners will gain knowledge on working with string data types and manipulations of strings.
Exercise 7	The learners will understand the core concepts of oops like operator overloading.
Exercise 8	The students learn to convert one class type to another i.e. user defined to basic and vice-versa.
Exercise 9	The learners gain knowledge in inheritance and its application.
Exercise 10	The students will learn to use virtual function and friend function.
Exercise 11	The learners will again exposure in working with templates.
Exercise 12	The learners will learn to work with file system.
Exercise 13	The learners work on larger programs using multifile system.

ENGINEERING CHEMISTRY LABORATORY

L	T	P	C
0	0	2	1

Course code:

BCH/BEC/BEE/BEI/BIC/BBT/BBE/BBI/MNN/MIC/MCS/MPS/
MBI/MCH/MBT CCM109R01
BCE/BCS/BME/BMT/BIT/MST/MCM/MAM/MAU/ BAS CCM209R01

COURSE OBJECTIVES:

This is a laboratory course and the experiments are designed in such a way that they complement the theoretical contents which the students learn in their Engineering Chemistry course. The main objective is to give hands-on experience to students about various kinds of experiments in general chemistry which has engineering applications. While carrying out the following experiments, the art of reading, documenting and interpreting scientific data will be readily imparted to the students.

LIST OF EXPERIMENTS:

1. Determination of total hardness of water by EDTA method.
2. Estimation of Chemical Oxygen Demand (COD) in wastewater.
3. Estimation of sodium and calcium ions in water by flame photometry.
4. Estimation of iron (II) using diphenylamine indicator (Dichrometry - Internal indicator method).
5. Estimation of chloride ion using potassium chromate indicator (Mohr's method).
6. Determination of pH of a solution and pH metric titration.
7. Preparation of polystyrene by free radical polymerization.
8. Determination of molecular weight of a high polymer-Viscometry.
9. Determination of single electrode potential.
10. Determination of iron (II) using potentiometer (Redox titration).
11. Determination of equivalent conductance at infinite dilution for a strong electrolyte (NaCl).
12. Conductometric titration of strong acid Vs strong base (Neutralization titration)
13. Conductometric titration of barium chloride Vs sodium sulphate (Precipitation titration)
14. Determination of corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium. (Mass loss method).

LEARNING OUTCOMES:

Experiment 1	Students will learn how a simple technique of titration can give the vital parameter namely hardness of water in a relatively easy manner. Students will also learn the possible source of error in doing the titration.
Experiment 2	Students will be able to learn an elegant technique which is used to estimate the chemical oxygen demand of waste water besides learning the skill involved in titrations.
Experiment 3	The learner will understand the concepts of estimating ions such as calcium,

	sodium and potassium using a flame photometer.
Experiment 4	The learner will get to know about internal indicator and its role in the titration. Students will also learn the have knowledge of estimating Iron (II) volumetrically using an internal indicator.
Experiment 5	Students learn that besides carbonates and bicarbonates, chloride also causes hardness and by doing this experiment, they will learn how to estimate it using the technique of titration with silver nitrate.
Experiment 6	Students will learn what a pH electrode is made of, its working principle and its application. They will learn a physical technique to estimate the strength of acid other than the titration method. By carrying out this experiment, they will also learn how to visualize the scientific data by plotting the graph and learn how to interpret the data. Through this experiment they will also get to verify and thereby understand the practical aspects of first derivatives which they learn in their introductory calculus lessons.
Experiment 7	The learner will have an understanding of preparing polystyrene from styrene and will also get acquainted by the free radical mechanism of polymerization.
Experiment 8	The student will learn a technique to measure the molecular weight of a polymer by measuring the viscosity. This experiment also involves visualizing the observed data through plots.
Experiment 9	The student will get a hands-on experience in measuring the single electrode potential of a particular electrode. While carrying out this experiment, they will also get to learn the basics of electrode, namely anode, cathode etc and their working principle.
Experiment 10	The learner will have an understanding of redox titrations which they will use to estimate Iron (II) using potentiometry. This is an alternate method to estimate iron (II) as they have already learnt to estimate it using titrimetry. So this will give them an exposure to an additional technique. Here they will once again learn how to visualize scientific data and get to see the practical dimensions of first derivative which is commonly used in calculus.
Experiment 11	The learner will get to verify the Kohlraush's law by measuring the conductance of a strong electrolyte at infinite dilution. They will learn how to prepare different dilutions of a concentrated solution and once again learn how to interpret a scientific data using graphs.
Experiment 12	– Acid base titration is something that students learn in their high school. In this experiment they will get to see how a different observable, namely conductance, measured by appropriate electrodes, helps to estimate the strength of the acid in a complementary way. In this experiment also, they will learn the importance of plotting the scientific data and interpreting it.
Experiment 13	Reactions which result in precipitation usually deceives the performer as the colour change in the end-point gets easily masked. In this experiment students will learn an elegant method to circumvent this problem by measuring the conductance of the ions resulting in the precipitating reaction.
Experiment 14	The students will have an understanding about the change in corrosion rate in presence of inhibitors.

COMPUTER AIDED DRAWING LAB

L	T	P	C
0	0	2	1

Course code:

BCH/BEC/BEE/BEI/BIC/BBT/BBE/BBI/MNN/MIC/MCS/MPS/
MBI/MCH/MBT CCE110R01

BCE/BCS/BME/BMT/BIT/MST/MCM/MAM/MAU/ BAS CCM210R01

COURSE OBJECTIVE:

To train the students to create simple engineering designs and draft models/ figures interactively using AutoCAD Software.

LIST OF EXERCISES USING AUTOCAD SOFTWARE:

1. Introduction to AutoCAD
2. Basic commands of AutoCAD
3. Modifying commands
4. Editing commands
5. Changing Object Properties
6. Text and Dimensioning
7. Drawing Information
8. Orthographic and Isometric Drawing
9. 3-D Drawing
10. 3-D Model -Wire frame model, Surface model, Solid Model

TEXT BOOKS:

1. Gopalakrishnan K.R. 1983 Engineering Drawing (I and II) Subhas Stores, Avenue Road, Bangalore,2008.
2. Natararjan K.V., A text book of Engineering Drawing, Dhanalakshmi Publications, Chennai, 2008.

REFERENCE BOOKS:

1. Parkinson, A.C. Intermediate Engineering Drawings – ELBS. 2009
2. Venugopal K., Engineering Drawing and Graphics, New age international (P) Ltd., Chennai,2010.
3. Narayana K.L., Kannaiah, P & Venkata Reddy K. Machine Drawing, New Age Internations,(P) Ltd., Chennai, 2007.
4. M.B.Shah and B.C.Rana. Engineering Drawing, Pearson Publications,2010.
5. Dhananjay AJolhe, Engineering Graphics, McGraw-Hill Publishing Company, Ltd, 2009.

LEARNING OUTCOMES:

Exercise I & II	The learner will be able to understand the importance of Computer Aided Drawing
Exercise III & IV	The learner will be able to edit and correct the drawn models using editing tools
Exercise V & VI	The learner will be able to modify the object properties and add text and dimensioning to the objects.
Exercise VII & VIII	The learner will be trained to draw simple objects both in orthographic and isometric projections.
Exercise IX & X	The learner will be able to use GUI for drawing basic 3D shapes like cylinder, sphere, cone and wedge, also to create extruded solids with wire frame models, surface models and solid models.