

The university logo consists of several overlapping circles in blue, black, and yellow.

**Chhattisgarh Swami Vivekanand  
Technical University B.E./B.Tech  
CSE Sem 1 syllabus**

## **Mathematics-I**

### **Mathematics - I**

**Credits: 4**

#### **UNIT I: Calculus**

Evaluation of definite and improper integrals, reduction formulae, Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

#### **UNIT II : Calculus**

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

#### **UNIT III : Sequences and series:**

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

#### **UNIT IV : Multivariable Calculus (Differentiation)**

Limit, continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence directional derivatives.

#### **UNIT V : Matrices**

Rank of a matrix by elementary transformation, normal form of a matrix, System of linear equations; Symmetric, skewsymmetric and

orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem and Orthogonal transformation.

### **Text/Reference Books**

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East-West press, Reprint 2005.

## **Programming for Problem Solving**

### **Programming for Problem Solving**

**Credits: 3**

#### **Unit I: Introduction**

Introduction to Programming, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), Idea of Algorithm: steps to solve logical and numerical problems.

Representation of Algorithm: Flowchart, Pseudo code and Source code with examples.

#### **Unit II: Programming Concepts**

Variables, data types, memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence, Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching, Iteration and loops.

### **Unit III: Arrays**

Introduction to Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required).

### **Unit IV: Function**

Definition, prototyping, built in libraries, Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion: Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

### **Unit V: Structure**

Defining structures and Array of Structures, Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation), bit-fields. File handling: concept of a file, text files and binary files, Formatted I/O, file I/O operations, example programs

### **Text Books:**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

### **Reference Books:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

## **Chemistry-I**

### **Chemistry I**

### **Credits: 4**

### **Unit - I**

#### **Atomic & molecular structure**

MolecularorbitalTheory: Equationsfor atomic and molecular orbitals (LCAO), Energy level diagram of homo( $H_2, N_2, O_2, Li_2, F_2$ ) & heteromolecules ( $CO, NO, HF$ ), Concept of bond order. Pi-molecular orbitals of butadiene, benzene and aromaticity. CrystalFieldTheory: Splitting of d-orbital of octahedral and tetrahedral complexes, Energy level diagram

of transition metal ion & magnetic property, numerical based on Crystal field stabilization energy.

## **Unit - II**

### **Spectroscopic techniques and applications**

Principle of spectroscopy. Electromagnetic radiation, Spectrophotometer (line diagram) Electronic Spectroscopy (Ultraviolet-visible spectroscopy): Theory, Types of electronic transition, Chromophore, auxochromes, Electronic excitation in conjugated dienes, Absorption Laws, applications on quantitative analysis, Simple numerical based on absorption laws and uses or application of Electronic Spectroscopy. Vibrational spectroscopy (Infrared spectroscopy): Molecular vibration, Selection rule, functional group region, fingerprint region and uses or application of Vibrational spectroscopy. Nuclear magnetic resonance spectroscopy: Introduction, number of signal, chemical shift, Spin-spin coupling and uses or application of Nuclear magnetic resonance spectroscopy.

## **Unit - III**

### **Use of free energy in Chemical Equilibria**

Thermodynamic Functions: Energy, Entropy, Free energy, Cell potential & related numericals, Estimations of entropy and free energies, Nernst Equation & its application to voltaic cell, Relation of free energy with EMF. Corrosion: Electrochemical theory of corrosion, galvanic series, Galvanic corrosion, Differential aeration corrosion, Pitting, and Water line corrosion, Caustic embrittlement, factors affecting corrosion, Cathodic Protection.

## **Unit -IV**

### **Periodic properties**

Periodic table, atomic and ionic radii, ionisation energies, electron affinity, electronegativity. Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms. Polarizability, Oxidation states, coordination numbers and geometries, Hard, soft acids and bases (Classification, Pearson's HSAB principle, its applications & limitations) Mole electron pair repulsion theory to  $\text{NH}_3$ ,  $\text{H}_3\text{O}^+$ ,  $\text{SF}_4$ ,  $\text{ClF}_3$ ,  $\text{ICl}_2$  and  $\text{H}_2\text{O}$ ), Numerical based on effective nuclear charge.

## **Unit -V**

## **Organic reactions and synthesis of drug molecule**

Introduction to reactions involving substitution (free radical-Chlorination of molecule, Gomberg reaction, Wurtz reaction, Electrophilic, Nucleophilic-SN1 SN2 ), Addition (Electrophilic-Markovnikov rule, Nucleophilic) Elimination (  $\alpha$  elimination ,  $\beta$  elimination , unimolecular E1, bimolecular E2), oxidation (Baeyer Villiger oxidation), reduction (Clemmensen reduction, Wolff-Kishner reduction) cyclization (Bergman Cyclization) and ring openings and rearrangement reaction ( Beckmann, Reimer-Tiemann reaction, Cannizzaro, crossed Cannizzaro reaction) Synthesis of a commonly used drug molecule: General guidelines of drug making, synthesis of Aspirin, Ibuprofen, Paracetamol.

## **Unit -VI**

### **Introduction to quantum theory**

Schrodinger equation & its importance, Application to hydrogen atom, Wave mechanical model for many electron atoms - radial distribution curves.

## **Unit -VII**

### **Chemical bonding in molecules:**

MO theory, Structure, bonding and energy levels of bonding and shapes of many atom molecules, Coordination Chemistry, Electronic spectra and magnetic properties of complexes with relevance to bio- inorganic chemistry, organometallic chemistry.

## **Unit -VIII**

### **Stereochemistry:**

Introduction to Stereochemistry: Representations of 3 dimensional structures, Chirality, Optical activity. Isomerism- structural isomerism, stereoisomers, enantiomers, diastereomers, Configurations (D, L & R, S), Geometrical isomerism (cis and trans & E and Z). Racemic modification & their resolution, Isomerism in transitional metal compounds. Conformational analysis: Conformations of cyclic ( cyclohexane) and acyclic compounds (ethane & butane).

## **Unit -IX**

### **Reactivity of organic molecules:**

Organic acids and bases: factors influencing acidity, basicity, and

nucleophilicity of molecules, kinetic vs. thermodynamic control of reactions.

## **Unit -X**

### **Strategies for synthesis of organic compounds:**

Reactive intermediates substitution, elimination, rearrangement, kinetic and thermodynamic aspects, role of solvents.

### **Text Books:**

1. A. Text Book of Engg. Chemistry, Shashi Chawala, Dhanpat Rai & Co. (P) Ltd.
2. Engineering Chemistry by P.C. Jain (Dhanpat Rai Publishing Company).
3. Engineering Chemistry, Concept in engineering Chemistry by Satyaprakash and Manisha Agrawal by Khanna Publication.

### **Books for Chemical Engineering:**

1. Advanced Inorganic Chemistry Vol 1 & II by Gurdeep Raj, Goel Publishing House.
2. Organic Reaction and Their Mechanism, P.S. Kalsi, New Age International Publishers.

### **Reference Books:**

1. University Chemistry, by B.H. Mahan
2. Chemistry: Principles and Applications, by M.J. Sienko and A. Plane
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P.W. Atkins
6. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E. Schore, 5th Edition
7. Essentials of Physical Chemistry, Bahi & Tuli, S. Chand Publishing
8. Introduction to Nanoscience by S.M. Lindsay

## **English**

### **English**

**Credits: 2**

## **UNIT - I**

### **Vocabulary Building**

- 1.1 Root words from foreign languages and their use in English
- 1.2 Acquaintance with prefixes and suffixes from foreign languages in

English to form derivatives.

1.3 Synonyms, antonyms, Homonyms and Homophones.

1.4 One Word Substitution

1.5 Basics of Phonetics: Definitions, Phonetic Symbols, Transcription of one and two syllable words

1.6 Communication: Definition, Cycle, Elements, 7Cs & Barriers

## **UNIT - II**

### **Basic Writing Skills**

2.1 Types of Sentences and Tenses, Voices and narration

2.2 Use of phrases and clauses in sentences

2.3 Importance of proper punctuation

2.4 Creating coherence

2.5 Techniques for writing precisely

## **UNIT - III**

### **Identifying Common Errors in Writing**

3.1 Parts of speech, Subject-verb agreement

3.2 Noun-pronoun agreement

3.3 Misplaced modifiers

3.4 Articles

3.5 Prepositions

3.6 Redundancies

3.7 Clichés

3.8 Errors in Spelling/ Misspelled words

## **UNIT - IV**

### **Writing Practices**

4.1 Comprehension

4.2 Précis Writing

4.3 Essay Writing

4.4 Business Letters & Job Application

4.5 Formal Reports: Components & Characteristics

4.6 Writing e-mails

## **UNIT - V**

### **Listening**

5.1 Listening: Definition, purposes, types, and strategies to improve listening.

5.2 Characteristics of effective listening.

5.3 Barriers to Listening and measures to overcome barriers

5.4 Note making: types and conversion of notes into texts.

## **UNIT - VI**

## **Oral Communication (This unit involves interactive practice sessions in Language Lab)**

6.1 Listening Comprehension

6.2 Pronunciation, Intonation, Stress and Rhythm

6.3 Common Everyday Situations: Conversations and Dialogues

6.4 Communication at Workplace

6.5 Interviews

6.6 Formal Presentations

### **Suggested Books:**

1. Practical English Usage. Michael Swan. OUP. 1995.

2. Remedial English Grammar. F.T. Wood. Macmillan.2007

3. On Writing Well. William Zinsser. Harper Resource Book. 2001

4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.

5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

7. English and Communication Skills for Students of Science and Engineering. S.P. Dhanavel. Orient Blackswan Ltd.2009.

8. Scientific English: A Guide for Scientists and Other Professionals. R A Day. Universities Press. 2000.

9. Word Power Made Easy. Norman Lewis. W R Goyal Publishers and Distributors. Publishers. 2009

10. Textbook of English Phonetics for Indian Students. T Balasubramaniam. Macmillan Publishers.2012

11. Technical Communication: Principles and Practice. Meenakshi Raman and Sangeeta Sharma. Oxford University Press. 2015.

## **Basic Civil Engineering and Mechanics**

### **Basic Civil Engineering & Mechanics**

**Credits: 3**

#### **UNIT - I**

##### **Building Material**

Qualities of good brick, Water absorption and Compressive Strength test for bricks. Types of Cement, Ingredients of Portland cement and their functions, Fineness, Setting Times and Compressive Strength of Cement, Functions of Sand in mortar, Mortar Mix proportions for various uses.



## **UNIT - II**

### **Building Construction**

Ingredients of Cement Concrete, Grades of Concrete, proportions for Nominal mix concrete, Workability & Compressive Strength of Concrete, Curing of Concrete. Necessity of foundations, Definitions of Safe bearing capacity, Ultimate bearing capacity and factor of safety, Difference between Load Bearing & Framed Construction.

## **UNIT - III**

### **Surveying & Levelling**

Principles of Surveying, Technical terms, Calculation of reduced level by Height of instrument and Rise & Fall method, Simple problems in levelling.

## **UNIT - IV**

### **General System of Forces**

Equations of equilibrium for a system of concurrent forces in a plane. Constraint, Action and Reaction. Types of support and support reactions. Free Body Diagram - Body subjected to two forces & Body subjected to three forces. Moment of a force. Theorem of Varignon, Equations of Equilibrium.

## **UNIT -V**

### **Analysis of Plane Trusses**

Engineering Structures, Rigid or perfect Truss, Determination of Axial forces in the members of truss, Method of Joints, Method of Sections.

### **Text books:**

1. Comprehensive Basic Civil Engineering B.C. Punmia
2. Building construction by Ahuja and Birdi
3. Engineering Mechanics by A. K. Tayal

### **Reference books:**

1. Basic Civil Engineering by Ramamurutham
2. Engineering Mechanics by R. K. Bansal

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