# CMR TECHNICAL CAMPUS
## UGC AUTONOMOUS
### B. Tech. I Year Syllabus

## Common for ECE, CSE[AIML] & CSE[DS]

## I SEMESTER

| S.No. | Course Code | Course Title | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---------|
| 1 | 22MA101BS | Matrices and Calculus | 3 | 1 | 0 | 4 |
| 2 | 22PH102BS | Applied Physics | 3 | 1 | 0 | 4 |
| 3 | 22CS103ES | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 4 | 22EN104HS | English for Skill Enhancement | 3 | 0 | 0 | 3 |
| 5 | 22CS105ES | IT Workshop | 0 | 0 | 3 | 1.5 |
| 6 | 22PH106BS | Applied Physics Laboratory | 0 | 0 | 3 | 1.5 |
| 7 | 22CS107ES | Programming for Problem Solving Laboratory | 0 | 0 | 2 | 1 |
| 8 | 22EN108HS | English Language and Communication Skills Laboratory | 0 | 0 | 2 | 1 |
| 9 | 22CS109ES | Basic Elements of Engineering and Technology | 0 | 0 | 2 | 1 |
|  |  | Induction Programme |  |  |  |  |
|  |  | **Total** | **12** | **2** | **12** | **20** |

## II SEMESTER

| S.No. | Course Code | Course Title | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---------|
| 1 | 22MA201BS | Ordinary Differential Equations and Vector Calculus | 3 | 1 | 0 | 4 |
| 2 | 22CH202BS | Engineering Chemistry | 3 | 1 | 0 | 4 |
| 3 | 22CS203ES | Data Structures | 3 | 0 | 0 | 3 |
| 4 | 22EC204ES | Basic Electrical and Electronics Engineering | 3 | 1 | 0 | 4 |
| 5 | 22ME205ES | Computer Aided Engineering Graphics | 1 | 0 | 2 | 2 |
| 6 | 22CH206BS | Engineering Chemistry Laboratory | 0 | 0 | 2 | 1 |
| 7 | 22CS207ES | Data Structures Laboratory | 0 | 0 | 2 | 1 |
| 8 | 22EC208ES | Basic Electrical and Electronics Engineering Laboratory | 0 | 0 | 2 | 1 |
| 9 | 22CH209MC | Environmental Science | 3 | 0 | 0 | 0 |
|  |  | **Total** | **16** | **3** | **8** | **20** |

# CMR TECHNICAL CAMPUS
## UGCAUTONOMOUS

### B. Tech. II Year Syllabus

# Electronics and Communication Engineering

**III SEMESTER**

| S. No. | Course Code | Course Title | L | T | P | Credits |
|--------|-------------|--------------|---|---|---|---------|
| 1 | 22EC301PC | Electronic Devices and Circuits | 3 | 0 | 0 | 3 |
| 2 | 22EC302PC | Digital System Design | 3 | 0 | 0 | 3 |
| 3 | 22EC303PC | Signals and Systems | 3 | 0 | 0 | 3 |
| 4 | 22EC304PC | Probability Theory and Stochastic Processes | 3 | 0 | 0 | 3 |
| 5 | 22EC305ES | Network Analysis | 3 | 1 | 0 | 4 |
| 6 | 22EC306PC | Electronic Devices and Circuits Lab | 0 | 0 | 3 | 1.5 |
| 7 | 22EC307PC | Digital System Design Lab | 0 | 0 | 2 | 1 |
| 8 | 22EC308PC | Basic Simulation Lab | 0 | 0 | 3 | 1.5 |
| 9 | 22EN309MC | Gender Sensitization Lab | 0 | 0 | 2 | 0 |
| | | **Total Credits** | **15** | **1** | **10** | **20** |

**IV SEMESTER**

| S. No. | Course Code | Course Title | L | T | P | Credits |
|--------|-------------|--------------|---|---|---|---------|
| 1 | 22EC401PC | Analog and Digital Communications | 3 | 0 | 0 | 3 |
| 2 | 22EC402PC | Electronic Circuit Analysis | 3 | 0 | 0 | 3 |
| 3 | 22MA403BS | Numerical Methods and Complex Variables | 3 | 0 | 0 | 3 |
| 4 | 22EC404PC | Electromagnetic Waves and Transmission lines | 3 | 0 | 0 | 3 |
| 5 | 22EC405PC | Database Management Systems | 3 | 0 | 0 | 3 |
| 6 | 22EC406PC | Analog and Digital Communications Lab | 0 | 0 | 2 | 1 |
| 7 | 22EC407PC | Electronic Circuits Analysis Lab | 0 | 0 | 2 | 1 |
| 8 | 22EC408PC | Database Management Systems Lab | 0 | 0 | 2 | 1 |
| 9 | 22EC409PC | Real Time Project/ Field Based Project | 0 | 0 | 4 | 2 |
| 10 | 22EN410MC | Constitution of India | 3 | 0 | 0 | 0 |
| | | **Total Credits** | **18** | **0** | **10** | **20** |

# Matrices and Calculus

**B. Tech. I Semester**                                          **L  T  P  C**

**Subject Code: 22MA101BS**                              **3  1  0  4**

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** To learn
1. Types of matrices, their properties and concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of eigen values and eigenvectors and to reduce the quadratic form to canonical form.
3. Apply geometrical approach to the mean value theorems and their application to the mathematical problems and evaluation of improper integrals using Beta and Gamma functions.
4. Utilize partial differentiation, concept of total derivative and finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

## Course Outcomes:
### After completion of this course, the students will be able to:
1. Use the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigenvectors and reduce the quadratic form to canonical form using orthogonal transformation.
3. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
4. Apply the extreme values of functions of two variables with/ without constraints.
5. Compute multiple integrals and apply the concept to find areas, volumes.

### UNIT-I: Matrices                                        [12 Lectures]
Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations: solving system of Homogeneous and Non-Homogeneous equations, Gauss -elimination method, Gauss Seidel Iteration Method.

### UNIT-II: Eigen values and Eigen vectors                [12  Lectures]
Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT-III: Calculus                                      [12 Lectures]
Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem (without proof) with their Geometrical Interpretation and applications, Cauchy's Mean Value Theorem (without proof), Taylor's series for single variable.

Definition of improper integral: Definition of Beta and Gamma functions, properties, other forms of Beta functions, Relation between Beta and Gamma functions and their applications.

**UNIT-IV: Multivariable Calculus (Partial Differentiation and Applications) [12 Lectures]**

Definitions of Limit and continuity. Partial Differentiation, Euler's Theorem; Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

**UNIT-V: Multivariable Calculus (Integration)                    [12 Lectures]**

Evaluation of Double integrals (Cartesian and Polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple integrals: Change of variables (Cartesian to polar) for double integrals.

Applications: Areas and volumes by double integrals.

**TEXT BOOKS:**
1. T.K.V.Iyengar, B.Krishna Gandhi, Engineering Mathematics, S.Chand Publishers, 19$^{th}$ edition,2020
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44$^{th}$Edition,2018.
3. R.K. Jain and S.R.K. Iyengar, Advanced Engineering mathematics, Narosa Publications, 6$^{th}$ Edition, 2020.

**REFERENCE BOOKS:**
1. Erwin kreyzig, Advanced Engineering Mathematics, 9$^{th}$ Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9$^{th}$Edition, Pearson, Reprint,2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi publications, Reprint,2008.
4. H.K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S.Chand publishers, 2014.

**Web Links:**
1. https://www.mooc-list.com/tags/matrix
2. https://www.mooc-list.com/tags/mean-value-theorem

# Applied Physics

**B. Tech. I Semester**                                                                                           **L   T   P   C**

**Subjects Code: 22PH102BS**                                                                          **3   1   0   4**

**Prerequisites:** 10 + 2 physics
**Course Objectives:** The objectives of this course for the student are to:
1. Understand the basic principles of quantum physics and band theory of solids.
2. Summarize the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric and magnetic materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Explain the characteristics of lasers and optical fibres.

## Course Outcomes:
## After completion of this course, the students will be able to:
1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric and magnetic materials for their applications.
4. Interpret the features and applications of nanomaterials.
5. Relate various aspects of Lasers and Optical fibres and their applications in diverse fields.

## UNIT-I: QUANTUM PHYSICS AND SOLIDS                                                    [15 Lectures]
**Quantum Mechanics:** Introduction to quantum physics, Blackbody radiation, Planck's radiation law, Wein's and Rayleigh-Jean's law, Stefan-Boltzmann's law, Photo electric effect, De Broglie hypothesis, Davisson and Germer experiment, Heisenberg uncertainty principle, Born interpretation of the wave function, Time independent Schrodinger wave equation, Particle in one dimensional potential box.
Solids: Free electron theory (Drude and Lorentz, Sommerfield - qualitative), Fermi-Dirac distribution, Periodic potentials - Bloch's theorem, Kronig-Penney model (qualitative), E-K diagram, Effective mass of electron, Origin of energy bands- classification of solids.

## UNIT-II: SEMICONDUCTORS AND DEVICES                                                  [15 Lectures]
Introduction to semiconductors, Intrinsic and extrinsic semiconductors - carrier concentration, Direct and indirect band gap semiconductors, Hall effect, Construction, Principle of operation and characteristics of P-N Junction diode, Zener diode, Bipolar junction transistor (BJT), LED, PIN diode, Avalanche photodiode (APD) and Solar cells.

## UNIT-III: DIELECTRIC AND MAGNETIC MATERIALS                                [10 Lectures]
**Dielectric Materials:** Basic definitions, Electronic and ionic polarizations, Ferroelectric, Piezoelectric and Pyroelectric materials - applications.

**Magnetic Materials:** Hysteresis - soft and hard magnetic materials, Magnetostriction, Magneto resistance, Bubble memory devices, Magnetic field sensors and Multiferroics, Applications of magnetic materials.

## UNIT-IV: NANO TECHNOLOGY                                                                    [10 Lectures]
Nanoscale, Quantum confinement, Surface to volume ratio, Bottom-up fabrication: Sol-Gel, Precipitation, Combustion methods, Top-down fabrication: Ball milling, Physical vapor deposition (PVD), Chemical vapor deposition (CVD), XRD, SEM & TEM, Applications of nanomaterials.

## UNIT-V: LASER AND FIBER OPTICS                     [15 Lectures]

**Lasers:** Laser beam characteristics, three quantum processes, Einstein coefficients and their relations, Lasing action, Pumping methods, Ruby laser, Nd-YAG laser, He-Ne laser, Semiconductor laser, Applications of laser.

**Fiber Optics:** Introduction to optical fibers, Total internal reflection, Construction of optical fiber, Numerical aperture, Acceptance angle, Classification of optical fibers, Losses in optical fiber, Optical fiber for communication system, Applications of optical fibers.

### TEXT BOOKS:

1. M.N.Avadhanulu, P.G.Kshirsagar & TVS. Arun Murthy" A Textbook of Engineering Physics"- S.Chand Publications, 11th Edition, 2019.
2. Shatendra Sharma and Jyotsna Sharma, Engineering Physics, Pearson Publication, 2019.
3. Donald A, Neamen, Semiconductor Physics and Devices-Basic Principle–Mc Graw Hill, 4th Edition, 2021.
4. B.K.Pandey and S.Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition, 2022.
5. Narasimha Reddy Katta, Essentials of Nanoscience & Nanotechnology, Typical Creatives NANO DIGEST, 1st Edition, 2021.

### REFERENCE BOOKS:

1. H.C.Verma, Quantum Physics, TBS Publication, 2ndEdition2012.
2. Halliday, Resnick and Walker, John Wiley & Sons, Fundamentals of Physics 11thEdition, 2018.
3. Charles Kittel, Introduction to Solid State Physics, Wiley Eastern, 2019.
4. S.L.Gupta and V.Kumar, Elementary Solid State Physics, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya – Nano Materials, New Age International, 1stEdition, 2007.

### Web Links:

1. https://youtu.be/TcmGYe39XG0
2. https://youtu.be/JA3sCmrv11M
3. https://youtu.be/qUEbxTkPIWI

# Programming for Problem Solving

**B. Tech. I Semester**                                                      **L  T  P  C**

**Subject Code: 22CS103ES**                                              **3  0  0  3**

## Prerequisites: Basic knowledge on mathematics & problem solving skills.

**Course Objectives:**
1. Design solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.
2. Implement the programs using conditional statements and loops.
3. Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.
4. Develop the programs of searching and sorting techniques using Arrays.

**Course Outcomes: After completion of this course, the students will be able to:**
1. Illustrate and explain the basic computer concepts, algorithms, flowcharts and programming principles of C Language.
2. Develop C programs to solve simple mathematical and decision making problems.
3. Understand, distinguish and implement arrays, strings and structures to write C programs.
4. Understand the concepts of pointers and files using C programs.
5. Decompose a problem into functions and to develop modular reusable code.
6. Understand the Searching and sorting problems.

## UNIT – I:                                                          [10 Lectures]
Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, types of computer languages, compilers, creating, compiling and executing a program etc., Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart with examples.

Introduction to C Programming Language: History, Basic Structure of a C program, variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, type conversion, Bitwise operations: Bitwise AND, OR, XOR and NOT operators. I/O: Simple input and output with scanf and printf.

## UNIT - II:                                                          [12Lectures]
Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, go to, Iteration with for, while, do- while loops

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays
Strings: Introduction to strings, handling strings as array of characters, basic string handling functions available in C .
Structures: Defining structures, initializing structures, Nested structures, Array of structures
Unions: Defining Unions, initializing unions, basic program on union. Enumeration data type.

## UNIT - III:                                                          [10 Lectures]
Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation).

Pre-processor: Commonly used Pre-processor commands like include, define, undef, if, ifdef,

ifndef

Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Random access using fseek, ftell and rewind functions.

## UNIT - IV:                                                              [12 Lectures]

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, categories of functions, passing parameters to functions, call by value, Passing arrays to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions, Storage classes (auto, extern, static and register), The main method and command line arguments.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

## UNIT - V:                                                                [8 Lectures]

Basic searching in an array of elements (linear and binary search techniques).Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

### TEXT BOOKS:
1. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, 3rd edition,2006.
2. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson,2006.

### REFERENCE BOOKS:
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer, Pearson(16thImpression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, PearsonEducation.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill,4thEdition

## Web Links:
1. https://nptel.ac.in/courses/106104074
2. https://onlinecourses.nptel.ac.in/noc21_cs01/preview
3. https://www.includehelp.com/c-programming-examples-solved-c-programs.aspx
4. https://www.programiz.com/c-programming.

# English for Skill Enhancement

**B. Tech. I Semester**                                                                            **L   T   P   C**

**Subject Code: 22EN104HS**                                                           **3   0   0   3**

**Prerequisites:** Basic knowledge in Grammar as well as in prose

**Course Objectives:**

**This course will enable the students to:**
1. Improve the language proficiency of students in English with an emphasis on Vocabulary,Grammar, Reading and Writing skills
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:**

**After completion of the course, the students will be able to:**
1. Understand the importance of vocabulary and sentence structures.
2. Demonstrate their understanding of the rules of functional grammar.
3. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
4. Develop comprehension skills from the known and unknown passages.
5. Acquire basic proficiency in reading and writing modules of English.

**UNIT – I**                                                                                            **[8 Lectures]**

Chapter entitled '*Toasted English*' by R.K. Narayan from *"English: Language, Context and Culture"* published by Orient BlackSwan, Hyderabad.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes -Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives- Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading:    Reading and Its Importance- Techniques for Effective Reading.

Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT – II**                                                                                           **[7 Lectures]**

Chapter entitled **'Appro JRD' by Sudha Murthy** from *"English: Language, Context and Culture"published* by Orient BlackSwan, Hyderabad.

Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

**UNIT – III**                                                                                          **[8 Lectures]**

Chapter entitled 'Lessons from Online Learning' by F. Haider Alvi, Deborah Hurst et al from
*"English: Language, Context and Culture"* published by Orient BlackSwan, Hyderabad.
Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and
Tenses.
Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for
Practice.
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of
Requisition, Email Etiquette, Job Application with CV/Resume.

**UNIT – IV**                                                                                           **[8 Lectures]**

Chapter entitled 'Art and Literature' by Abdul Kalam from *"English: Language, Context and
Culture"* published by Orient BlackSwan, Hyderabad.
Vocabulary: Standard Abbreviations and Acronyms in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice
Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

**UNIT – V**                                                                                            **[7 Lectures]**

Chapter entitled 'Go, Kiss the World' by Subroto Bagchi from *"English: Language, Context and
Culture"* published by Orient BlackSwan, Hyderabad.
Vocabulary: Technical Vocabulary and their Usage
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports
Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: Listening and Speaking Skills which are given under Unit-6 in AICTE Model
Curriculum arecovered in the syllabus of ELCS Lab Course.

➢ **Note: 1**. As the syllabus of English given in AICTE *Model Curriculum-2018 for          B. Tech.
First Year is **Open-ended***, besides following the prescribed textbook, it is required to prepare
teaching/learning materials **by the teachers collectively** in the form of handouts based on the
needs of the students in their respective colleges for effective teaching/learning in the class.

➢ **Note**: **2**. Based on the recommendations of NEP2020, teachers are requested to be flexible to
adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent
of each topic from the syllabus in blended mode.

**TEXT BOOK:**
1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad.
   2022. Print.

**REFERENCE BOOKS:**
1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. Interchange Series. Introduction, 1,2,3. Cambridge University Press.
   (2022)
3. Wood, F.T. Remedial English Grammar. Macmillan. (2007).

4. Chaudhuri, Santanu Sinha. Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd. (2018).

5. Technical Communication. Wiley India Pvt. Ltd. (2019).
6. Vishwamohan, Aysha. English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd. (2013).
7. Swan, Michael. Practical English Usage. Oxford University Press. Fourth Edition. (2016).

**Web Links:**
**UNIT I**
Vocabulary - Prefixes and Suffixes
WL1:https://nptel.ac.in/courses/109106094/23
WL2:http://teacher.scholastic.com/reading/bestpractices/vocabulary/pdf/prefixes_suffixes.pdf

**Synonyms and Antonyms**
WL3:https://www.google.com/search?q=Synonyms+an+Antonyms+-+nptel+videos&nfpr=1&sa=X&ved=0ahUKEwi7pbzfluXfAhXBEbwKHXOqC4oQvgUILCgB&biw=1024&bih=657
WL4:https://scoop.eduncle.com/synonyms-antonyms-for-competitive-exams

**GRAMMAR - Common errors in Prepositions**
WL5:https://nptel.ac.in/courses/109104030/Module12/Lecture39.pdf
WL6:https://nptel.ac.in/courses/109104030/Module12/Lecture38.pdf
WL7:https://www.englishpractice.com/common-mistakes/common-errors-prepositions-3

**Techniques of Effective reading**
WL8:https://nptel.ac.in/courses/109106129/5
WL9:https://nptel.ac.in/courses/109106129/15
WL10:https://www.howtolearn.com/2012/08/different-reading-techniques-and-when-to-use-them/

**UNIT II**
GRAMMAR - Common errors in Noun and Pronoun agreement
WL11:https://nptel.ac.in/courses/109104030/Module12/Lecture39.pdf

**common errors and Rules of Subject-verb agreement**
WL12:https://nptel.ac.in/courses/109106094/8
https://www.grammarbook.com/grammar/subjectVerbAgree.asp

**Techniques for improving comprehension skills**
WL13:**https://nptel.ac.in/courses/109106129/5**
WL14:**https://joshkaufman.net/3-simple-techniques-to-optimize-your-reading-comprehension-and-retention/**

**UNIT III**
English Language
Vocabulary - Affixes
WL15:http://www.prefixsuffix.com/rootchart.php
**English words from Foreign languages**
WL16:https://www.fluentu.com/blog/english/english-words-from-other-languages/
WL17:https://en.oxforddictionaries.com/explore/foreign-words-and-phrases/
Misplaced modifiers
WL18:https://www.grammar-monster.com/glossary/misplaced_modifier.htm

**Reading**
WL19:http://www.bbc.co.uk/skillswise/topic/skimming-and-scanning
WL20:http://www.bbc.co.uk/skillswise/video/skimming-and-scanning

**Writing**
WL21:https://writeshop.com/choosing-vocabulary-to-describe-a-place/

**Writing formal letters**
WL22:https://nptel.ac.in/courses/109104031/14

**UNIT IV**
Vocabulary
WL23:https://www-pub.iaea.org/MTCD/DSS/OASISGlossary.pdf
WL24:https://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Composite%20Materials/pdf/Glossory.pdf
WL25:https://nptel.ac.in/courses/117105083/pdf/ssg_m2l2.pdf

**Reading**
WL26:https://nptel.ac.in/courses/109106066/module6/lecture12/lecture12.pdf

**Writing**
WL27:https://nptel.ac.in/courses/109106094/29
WL28:https://nptel.ac.in/courses/109106066/module3/lecture6/lecture6.pdf

**UNIT - V**
Vocabulary
WL29:https://nptel.ac.in/courses/109106066/module1/lecture1/lecture1.pdf

**Grammar - Common errors**
WL30:https://www.engvid.com/english-resource/50-common-grammar-mistakes-in-english/

**Reading**
WL31:https://nptel.ac.in/courses/109106066/module6/lecture12/lecture12.pdf

**Writing**
WL32:https://nptel.ac.in/courses/109104031/17
WL33:https://nptel.ac.in/courses/109107121/31

# IT Workshop

**B. Tech. I SEM**                                                                **L  T  P  C**

**Subject Code: 22CS105ES**                                               **0 0 3  1.5**

**Course Objectives:**

1. The IT Workshop is a training lab course to get training on PC Hardware, Internet &Worldwide Web and Productivity tools for documentation, Spreadsheet computations and Presentation.
2. To introduce to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers, hardware and software level troubleshooting process.
3. To introduce connecting the PC on to the internet from home and workplace and effectively usage of the internet, Usage of web browsers, email, newsgroups and discussion forums.
4. To get knowledge in awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks.
5. To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools.

**Course Outcomes:**
**After completion of this course, the students will be able to:**
1. Apply knowledge for PC hardware and computer parts.
2. Apply knowledge for computer assembling and software installation.
3. Ability how to solve the trouble shooting problems.
4. Apply the tools for preparation of project certificate, Creating a Newsletter.
5. Apply the tools for preparation of PPT, Documentation and budget sheet etc.

**PC Hardware:** The students should work on working PC to disassemble and assemble to working condition and install operating system like Linux or any other on the same PC. Students are suggested to work similar tasks in the laptop scenario wherever possible.

**Problem 1:** Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

**Problem 2:** Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

**Problem 3:** Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

**Problem 4:** Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. Internet & World Wide Web.

**Problem 5:** Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate how to access the websites and email.

**Problem 6:** Web Browsers, Surfing the Web: Students customize their web browsers with

the LAN proxy settings, bookmarks, search toolbars and popup blockers. Also, plug- ins like Macro media Flash and JRE for applets should be configured

**Problem 7:** Search Engines & Netiquette: Students should know what search engines are and howto use the search engines. Usage of search engines like Google, Yahoo, ask.com and others should be demonstrated by student.

**Problem 8:** Cyber Hygiene: Students should learn about viruses on the internet and install antivirus software. Student should learn to customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

**Problem 9:** Develop home page: Student should learn to develop his/her home page using HTMLconsisting of his/her photo, name, address and education details as a table and his/her skill set as a list. Productivity tools: Word Orientation: An overview of Microsoft (MS) office /equivalent (FOSS) tool word should be learned: Importance of MS office / equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that should be covered in each, using and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

**Problem 10:** Using and Word to create project certificate. Features to be covered: - Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs in word.

**Problem 11-**Spreadsheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler: - Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Calculating GPA - Features to be covered: - Cell Referencing, Formulae in spread sheet – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyperlinking, Count function, Sorting, Conditional formatting.

**Problem 12:** Creating Power Point: Student should work on basic power point utilities and tools in Latex and MS Office/equivalent (FOSS) which help them create basic power point presentation. PPT Orientation, Slide Layouts, Inserting Text, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting Images, Tables and Charts.

**REFERENCEBOOKS:**
1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education. LaTeX Companion – Leslie Lamport, PHI/Pearson.
2. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
3. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
   PC Hardware and A+ Handbook – Kate J. Chase PHI (Microsoft)

# Applied Physics Laboratory

**B. Tech I Semester**　　　　　　　　　　　　　　　　　　　**L  T  P  C**

**Subject Code: 22PH106BS**　　　　　　　　　　　　　　　**0  0  3   1.5**

**Prerequisites:** Practical physics at basic level.
**Co-Prerequisite:** A course on 'Applied physics laboratory'.

## Course Objectives: The objectives of this course for the student to
1. Capable of handling instruments related to photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, BJT, LED, solar cell, Hall effect and measurement of energy gap and resistivity of semiconductor materials.
3. To understand the characteristics of dielectric constant of a given material and study the behavior
   of B-H curve of ferromagnetic materials.
4. Understand the Characteristics of Laser and optical fiber measurements.
5. Understanding the method of Mechanical oscillator (Torsional) and electrical oscillator (LCR).

## Course Outcomes:

### After completion of this course, the students will be able to:
1. Know the determination of the Planck's constant using Photoelectric effect.
2. Appreciate quantum physics in semiconductor devices, optoelectronics and identify the material whether it is n-type or p-type by Hall experiment.
3. Gain the knowledge of applications of dielectric constant and understand the variation of magnetic field and behavior of hysteresis curve.
4. Gain the knowledge of Characteristics of Laser and optical fiber measurements.
5. Carried out data analysis.

## LIST OF EXPERIMENTS:
1. Determination of work function and Planck's constant using photoelectric effect.
2. To study the resonant frequency, bandwidth and quality factor of series and parallel LCR circuits.
3.  To study the V-I characteristics of a p-n junction diode.
4. a. To study the V-I characteristics of solar cell.
   b. To study the V-I characteristics of light emitting diode (LED).
5. Determination of energy gap of a semiconductor.
6. a. Determination of the V-I characteristics of the given LASER beam.
   b. Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
7. Determination of dielectric constant of a given material.
8. Study B-H curve of a magnetic material.
9. Determination of the resistivity of semiconductor by two probe method.
10. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
11. Input and output characteristics of BJT(CE,CB & CC configurations).
12. Understanding the method of least squares torsional pendulum as an example.

   *Note: Any 8 experiments are to be performed.*

## REFERENCE BOOK:
1. S. Balasubramanian, M.N.Srinivasan "A Textbook of Practical Physics"- S Chand Publishers,

2017.

# Programming for Problem Solving Laboratory

**B. Tech. I Semester**                                                **L  T  P  C**

**Subject Code: 22CS107ES**                                          **0  0  2  1**

**Co-requisites:**  A course  on Programming for problem solving.
Pre-requisites: Basic knowledge on mathematics & problem solving skills.

**Course Objectives:** The students will learn the following:
1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.

## Course Outcomes:
### After completion of this course, the students will be able to:
1. Develop C programs for simple numerical problems.
2. Apply the knowledge of conditional statements and loops in programs.
3. Implement the programs using the concepts of arrays, structures, pointers and files.
4. Create the programs using functions and recursive functions.
5. Implement searching and sorting algorithms.

**Practice sessions:**
a) Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.
b) Writeasimpleprogramthatconvertsonegivendatatypetoanotherusingautoconversionand casting. Take the values from standard input.

**Simple numeric problems:**
a) Write a program for finding the max and min from the three numbers.
b) Write the program for the simple, compound interest.
c) Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
d)  Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

> **5 x 1 = 5**
> **5 x 2 =10**
> **5 x 3 =15**

e) Write a C program for binary equivalent to a positive number 0 to 255.

**Expression Evaluation:**
a) Write a C program, which takes two integer operands and one operator from the user,

performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

b) Write a program that finds if a given number is a prime number
c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
e) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
f) Write a C program to find the roots of a Quadratic equation.

### Arrays, Pointers and Functions:
a) Write a C program to find the minimum, maximum and average in an array of integers.
b) Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
c) Write a C program that uses functions to perform the following:
d) Addition of Two Matrices
e) Multiplication of Two Matrices
f) Transposeofamatrixwithmemorydynamicallyallocatedforthenewmatrixasrowandcolumn counts may not be the same.
g) Write C programs that use both recursive and non-recursive functions
h) To find the factorial of a given integer.
i) To find the GCD (greatest common divisor) of two given integers.
j) To find x^n

### Files:
a) Write a C program to display the contents of a file to standard output device.
b) Write a C program which copies one file to another file..
c) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

### Strings:
a) Write a C program to implement string handling functions.
b) Write a C Program to find the length of a given string without using strlen() function.
c) Write a C Program to concatenate two string without using a function.

### Miscellaneous:
a) Write a C program to construct a pyramid of numbers as follows:

```
    1            *           1           1           *
   1 2          * *         2 3         2 2         * *
  1 2 3        * * *       4 5 6       3 3 3        * *
                                                    *
                                     4 4 4 4       * *
                                                    *
```

### Sorting and Searching:
a) Write a C program that uses non-recursive function to search for a Key value in a given List of integers using linear search method.
b) Write a C program that uses non-recursive function to search for a Key value in a given Sorted list of integers using binary search method.

c) Write a C program that implements the Bubble sort method to sort a given list of Integers in ascending order.

d) Write a C program that sorts the given array of integers using selection sort in descending order

e) Write a C program that sorts the given array of integers using insertion sort in ascending order

**TEXT BOOKS:**
1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson,2013.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition),2006.

**REFERENCE BOOKS:**
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition,McGraw-Hill.
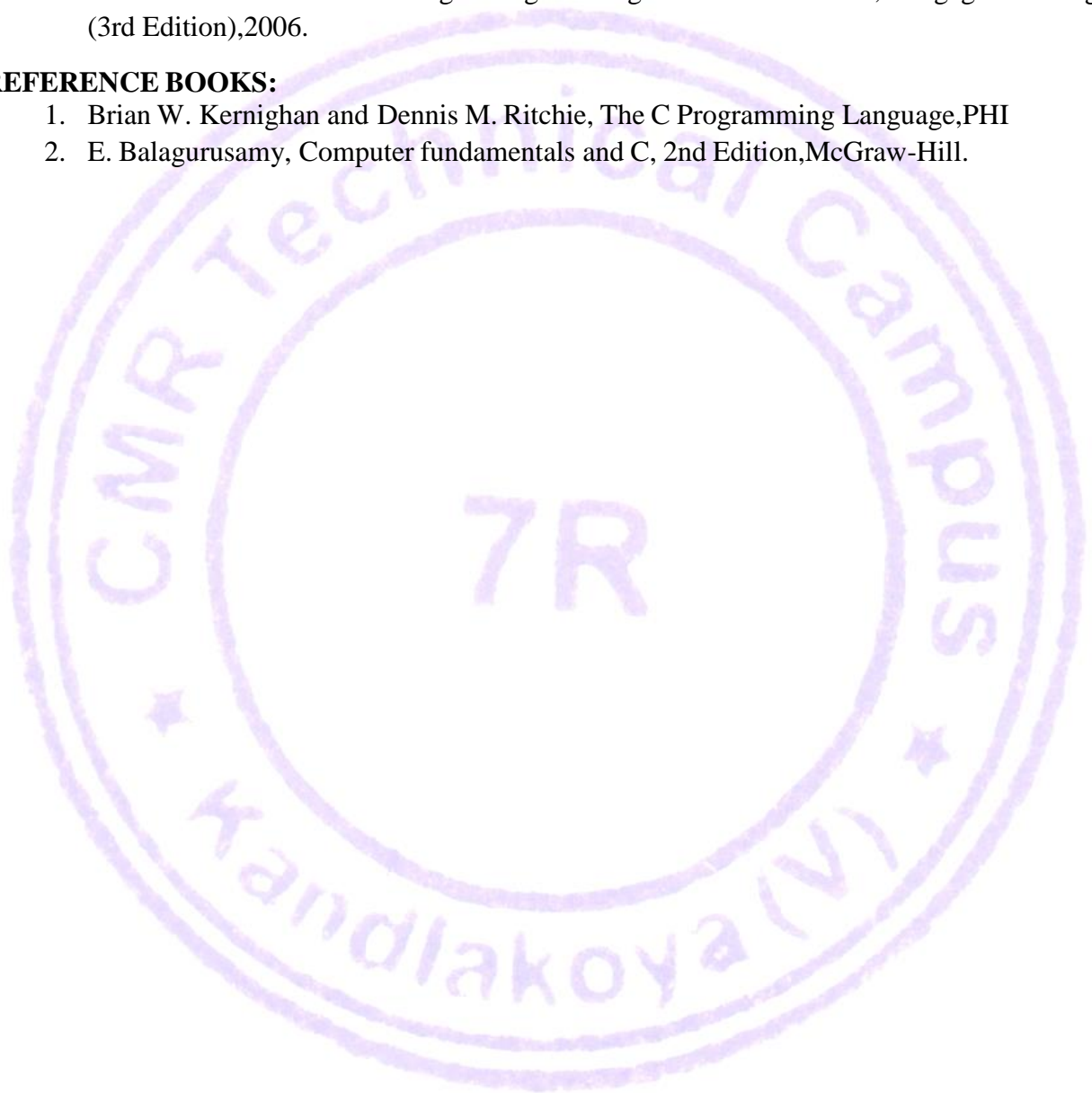
# English Language and Communication Skills Lab

**B. Tech. I Semester**                                                                 **L  T  P  C**

**Subject Code: 22EN108HS**                                                       **0  0  2  1**

**Prerequisites:** Basic Knowledge in speech sounds as well as formal and informal communication

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**
1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

**Course Outcomes:**
**After completion of this course, the students will be able to:**
1. Pronounce English sounds according to standard pronunciation
2. Understand the nuances of English language through audio- visual experience and practice
3. Speak with clarity and confidence which in turn enhances their employability skills
4. Neutralize their accent for intelligibility
5. Participate in discussion and presentation effectively and confidently

**Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**
a) Computer Assisted Language Learning (CALL) Lab
b) Interactive Communication Skills (ICS) Lab

**Listening Skills:**
## Objectives
1. To enable students to develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

**Speaking Skills:**
## Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions

The following course content is prescribed for the **English Language and communication Skills Lab**.

### Exercise – I
**CALL Lab:**
*Understand:* Listening Skill- Its importance – Purpose- Process- Types
*Practice***:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants
**ICS Lab**:
*Understand:* Spoken vs. Written language- Formal and Informal English**.**
*Practice:* **Ice-**Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave –Introducing Oneself and Others.

### Exercise – II
**CALL Lab:**
*Understand:* Listening Skills: Barriers- Effective Listening.
*Practice:* Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*
**ICS Lab**:
*Understand:* Features of Good Conversation – Strategies for Effective Communication.
*Practice:* Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

### Exercise-III
**CALL Lab**:
*Understand:* Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.
*Practice:* Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences – Intonation - *Testing Exercises*
**ICS Lab:**
*Understand:* Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing
*Practice:* Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

### Exercise – IV
**CALL Lab:**
*Understand:* Errors in Pronunciation-Neutralization of Mother Tongue Interference (MTI).
*Practice:* Common Indian Variants in Pronunciation – Differences between British and

American Pronunciation -*Testing Exercises*

**ICS Lab:**

*Understand:* Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.

*Practice:* Making a Short Speech – Extempore- Making a Presentation.

**Exercise – V**
**CALL Lab:**
*Understand:* Listening for General and Specific Details.
*Practice:* Listening Comprehension Tests -*Testing Exercises*
**ICS Lab**:
*Understand:* Introduction to Group Discussion
*Practice:* Group Discussion

**Minimum Requirement of infrastructural facilities for ELCS Lab:**
### 1. Computer Assisted Language Learning (CALL) Lab:
**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.
**System Requirement (Hardware component):**
*Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*
   i)      Computers with Suitable Configuration
   i i)     High Fidelity Headphones
### 2. Interactive Communication Skills (ICS) Lab :
**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo  –audio & video system and camcorder etc.
**Source of Material (Master Copy):**
* *Exercises in Spoken English. Part 1,2,3*. CIEFL and Oxford University Press

## Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

**Suggested Software:**
   • Cambridge Advanced Learners' English Dictionary with CD.
   • Grammar Made Easy by Darling Kindersley.
   • Punctuation Made Easy by Darling Kindersley.
   • Oxford Advanced Learner's Compass, 10th Edition.
   • English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
   • English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
   • English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
   • TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
   • Digital All

- Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. *English Language Communication Skills – Lab Manual cum Workbook.* Cengage Learning India Pvt. Ltd. (2022).

2. Shobha, KN & Rayen, J. Lourdes. *Communicative English – A workbook.* Cambridge University Press. (2019).

3. Kumar, Sanjay & Lata, Pushp. *Communication Skills: A Workbook.* Oxford University Press. (2019).

4. Board of Editors.*ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black Swan Pvt. Ltd. (2016).

5. Mishra, Veerendra et al. *English Language Skills: A Practical Approach.* Cambridge University Press. (2020).

**WEB LINKS:**

**Listening Skills Lecture nptel**
WL1:https://www.youtube.com/watch?v=JIKU_WT0Bls

**NPTEL on role-play and conversation skills**
WL2:https://www.youtube.com/watch?v=0AM35Nu5McY&list=PLbMVogVj5nJT3a24lj4KOkQCOElxcDQrs

**NPTEL on syllables**
WL3:https://www.youtube.com/watch?v=4V2CwQJ8pgc

**NPTEL on listening for general details**
WL4:https://www.youtube.com/watch?v=xY7z3nZOHqk&list=PLzJaFd3A7DZtnTdtOxvjO3GLPd1WVe6oq&index=17

**NPTEL on stress shifts**
WL 5: https://www.youtube.com/watch?v=_KHtfvob4j4

**NPTEL on weak forms and strong forms**
WL6:https://www.youtube.com/watch?v=VM0cNDxBySc&list=PL0P6HKIuShRnJeZjhAOy-2NejNjeC2_x2

**WL7:NPTEL on Intonation**
https://www.youtube.com/watch?v=A6aE4nceJt8

# Basic Elements of Engineering Technology

**B. Tech. I Semester**                                                    **L  T  P  C**

**Subject Code: 22CS109ES**                                          **0  0  2  1**

### Objectives:
- Exploring different engineering technologies and their applications.
- Students should able to learn various 3d printing technologies.
- Knowledge towards Assembling and testing of robots.
- Understanding functionality of 3Dprinters and their application.
- Developing team work and in sight towards different disciplines of Engineering.

### Module I: Internet of Things
Overview of IoT and Architecture: Brief History, evolution of IoT, Architecture, trends in the Adoption of IoT, Societal Benefits of IoT, Risks, Privacy, Security, Embedded Systems Components, Micro-controller Architecture and Properties and Installing and Setting up the Arduino and Raspberry Pi (RPi) development environment. Build Simple IoT Applications by using Arduino or RPi.

### Module II: Robotics
Introduction, Different types of robots, Components of a Robot, Working principle of robots, Applications of robots in various fields, Innovation challenges, Scope of robotics research & its current trends, assembling and testing of Robot.

### ModuleIII:3D Printing
Introduction, Product Design & Development, 3D Scanning & Printing using different types of materials. Components of 3D Printer, Applications of 3D printed products in various fields, Hands on Experience on 3D printing Machine.

### Module IV:  Software and Post Processing
Cura, Flash print, 3dslicer, Tinkercad, Meshmixer. 3d printing parameters, print Speed, Layer Height, Infill density.Acetone bathing, Support Structure Removing.

### Module V: Case Studies
Students has to submit a report by doing a study on various Engineering applications related to Manufacturing, Retail, Automotive, Logistics, Healthcare, Entertainment and E-Governance.

### REFERENCE BOOKS:
1. PC Hardware-A Handbook –KateJ. Chase PHI(Microsoft)
2. ITEssentialsPCHardwareandSoftwareCompanionGuideThirdEditionbyDavid Anfinsonand Ken Quamme.– CISCO Press, Pearson Education.
3. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015,ISBN: 9788173719547.

4. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace,O'Reilly (SPD),2014,ISBN: 9789350239759
5. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression,2010.
6. DebSR.andDebS.,—RoboticsTechnologyandFlexibleAutomation‖,TataMcGrawHill Education Pvt.Ltd,2010.
7. MikellP Groover,—Automation, Production Systems,and computerintegratedManufacturing‖,PrenticeHall, 2001.
8. CheeKaiChua,KahFaiLeong,3DPrintingandAdditiveManufacturing: Principles andApplications: Fourth Edition of Rapid Prototyping.
9. Andreas Gebhardt, Understanding Additive Manufacturing: RapidPrototyping, Rapid Tooling, Rapid Manufacturing.
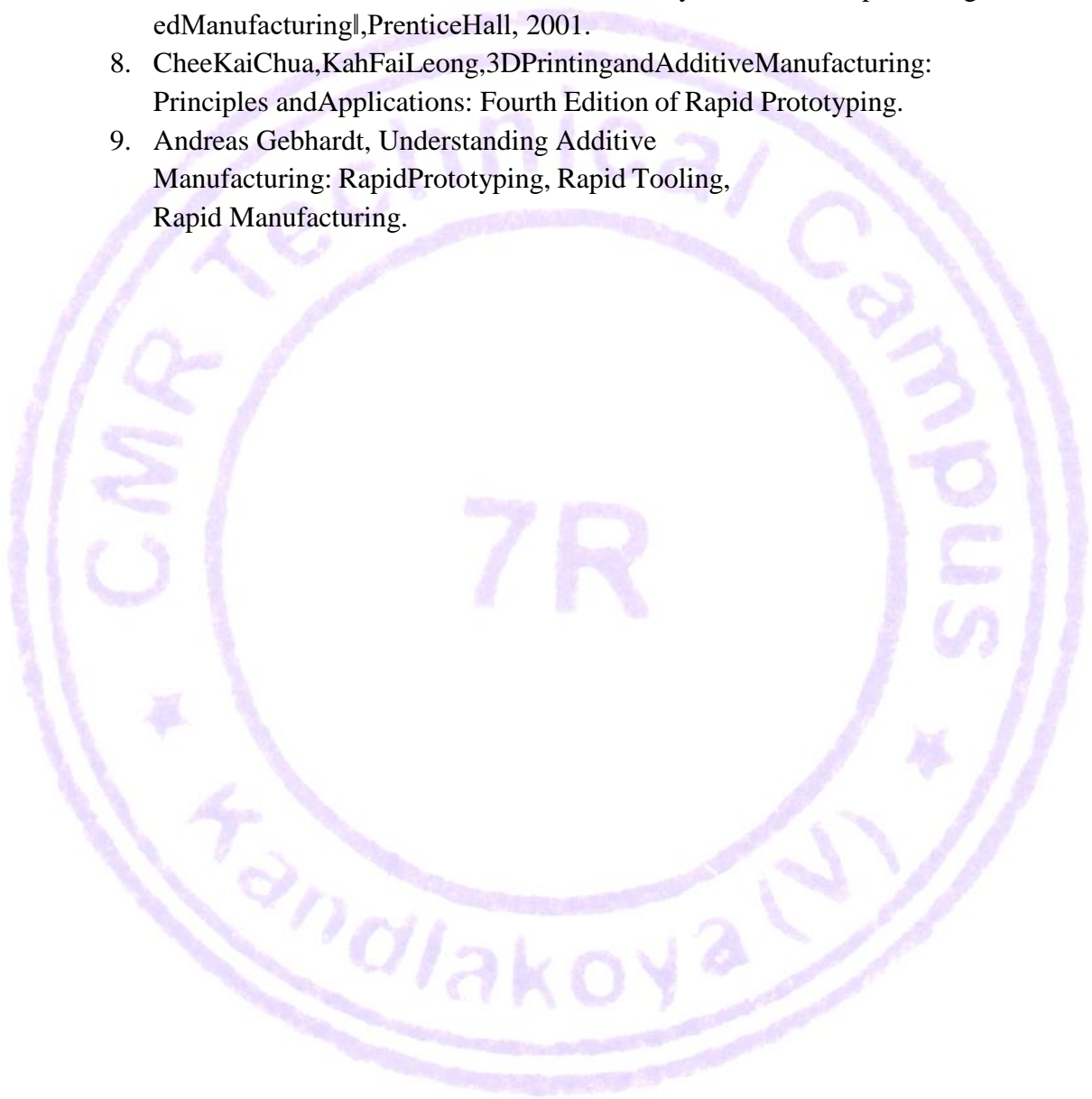
# Ordinary Differential Equations and Vector Calculus

**B. Tech. II Semester**                                                                        **L  T  P  C**

**Subject Code: 22MA201BS**                                                            **3  1  0  4**

Pre-requisites: Mathematical Knowledge at pre-university level
**Course Objectives:** To learn
1. Methods of solving the differential equations of first order differential equations.
2. Methods of solving the differential equations of higher order differential equations.
3. Concept, properties of Laplace transforms and Solving ordinary differential equations using Inverse Laplace transforms techniques.
4. The physical quantities of vector valued functions involved in engineering field
5. The basic properties and their applications to line and surface integrals.

**Course outcomes:** After learning the contents of this paper the student must be able to
1. Identify whether the given differential equation of first order is exact or not.
2. Solve higher order  differential equations.
3. Use Laplace transforms techniques to  find the derivatives and integrals of given functions & inverse Laplace transforms techniques for solving ODE's
4. Analyze  vector and scalar point functions.
5. Evaluate the line and surface integrals and converting them from one to another

**UNIT-I: First Order ODE**                                                                    [ **12 Lectures**]
Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates).

## Applications: Newton's law of cooling, Law of natural growth and decay.

**UNIT-II: Ordinary Differential Equations of Higher Order**               [ **12 Lectures**]
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}$,$\sin ax$, $\cos ax$, polynomials in $x$, $e^{ax}V(x)$ and $xV(x)$,  method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

**UNIT-III: Laplace transforms**                                                           [**16 Lectures**]
Laplace Transforms: First shifting theorem and Change of scale property, Multiplication by 't' and division by 't', Laplace transforms of derivatives and integrals .Laplace transform of periodic functions. Inverse Laplace transforms: First Shifting theorem, Change of Scale Property, Inverse Laplace transforms of derivatives and Integrals, convolution theorem(without proof). Applications: Solving Initial value problems by Laplace Transform method.

**UNIT-IV: Vector Differentiation**                                                        [**10 Lectures**]
Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional

derivatives, Tangent plane and normal line, Scalar potential functions, Solenoidal and Irrotational vectors.

**UNIT-V: Vector Integration**                                              [ **10 Lectures]**

Line, Surface &Volume integrals. Theorems of Green, Gauss and Stokes (without proofs)
and their applications.

**TEXT BOOKS:**

1. B.S.Grewal, Higher Engineering Mathematics,KhannaPublishers,36<sup>th</sup>Edition,2021
2. R.K.JAIN, S.R.K.Iyengar,Advanced Engineering Mathematics,.Narosa Publishing House, 4<sup>th</sup>Edition New Delhi,2020
3. T.K.V.Iyengar, B.Krishna Gandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, S.Chand Publishing

**REFERENCE BOOKS:**

1. Kreyszing,Advanced Engineering Mathematics,.JohnWiley&Sons, 9<sup>th</sup>Edition 2006.
2. G.B.Thomas and R.L.Finney, Calculus and Analytic geometry,9<sup>th</sup> Edition,Pearson,Reprint,2002.
3. H.K.Dass and Er.Rajnish verma,Higher Engineering Mathematics,S Chand and Company Limited,New Delhi.
4. N.P.Bali and Manish Goyal,A text book of Engineering Mathematics, Laxmi Publocations,Reprint,2008

**Web Links:**

1. https://nptel.ac.in
2. https://onlinecourses.nptel.ac.in

# Engineering Chemistry

**B. Tech. II Semester**                                                     **L T P C**

**Subject Code: 22CH202BS**                                          **3 1 0 4**

Prerequesities: Engineering chemistry knowledge in school and college level.

## Course Objectives:
To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
1. To include the importance of water in industrial usage.
2. Analyze the properties and applications of industrial polymers.
3. Fundamental aspects of battery chemistry, significance of corrosion its control to protect the structures.
4. To imbibe the basic concepts of petroleum and its products.
5. To acquire required knowledge about engineering materials like cement, smart materials andLubricants.

## Course Outcomes:
**After completion of this course, the students will be able to:**
1. Identify the basic properties of water and its usage in domestic andindustrial purposes.
2. Learn the fundamentals and general properties of polymers and other engineeringmaterials. Apply in day to day life.
3. Make use of basic knowledge of electrochemical procedures related to corrosionand its control.
4. Interpret the concepts of petroleum products and cement, Smartmaterials.
5. Find potential applications of chemistry and practical utility in order to becomegood engineers and entrepreneurs.

## UNIT - I: Water Chemistry                                          [8 Lectures]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and numerical problems. Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation – Removal of F- ion in water by Nalgonda method. Desalination of water – Reverse osmosis.

## UNIT – II : Polymers                                                   [8 Lectures]

Definition – Classification of polymers with examples – Types of polymerization –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6.

**Plastics:** Definition and characteristics - thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite.

**Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, andThiokol rubber.

**Biodegradable polymers:** Concept and advantages - poly vinyl alcoholand their applications.

**Conducting polymers:** Characteristics and Classification with examples - mechanism Of conduction intrans - polyacetylene and applications of conducting polymers.

## UNIT - III: Batteries & Corrosion                                    [8 Lectures]

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Construction, working and applications of Lithium, Lithium ion and Zn-air battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells-Construction and applications of Methanol Oxygen fuel cell.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods. Metallic coating methods: Galvanization, Tinning and Eelectroplating

## UNIT - IV: Energy Sources:                                          [8 Lectures]

Introduction, Classification- Calorific value of fuel – HCV, LCV- Dulongs formula. solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Trans esterification, advantages.

## UNIT - V: Engineering Materials:                                     [8 Lectures]

**Cement:** Portland cement, its composition, setting and hardening.
Smart materials and their engineering applications
Shape memory materials- Poly L- Lactic acid. Thermo response materials- Polyacryl amides, Poly vinyl amides.

**Lubricants:** Classification of lubricants with examples-characteristics Of good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure) properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.
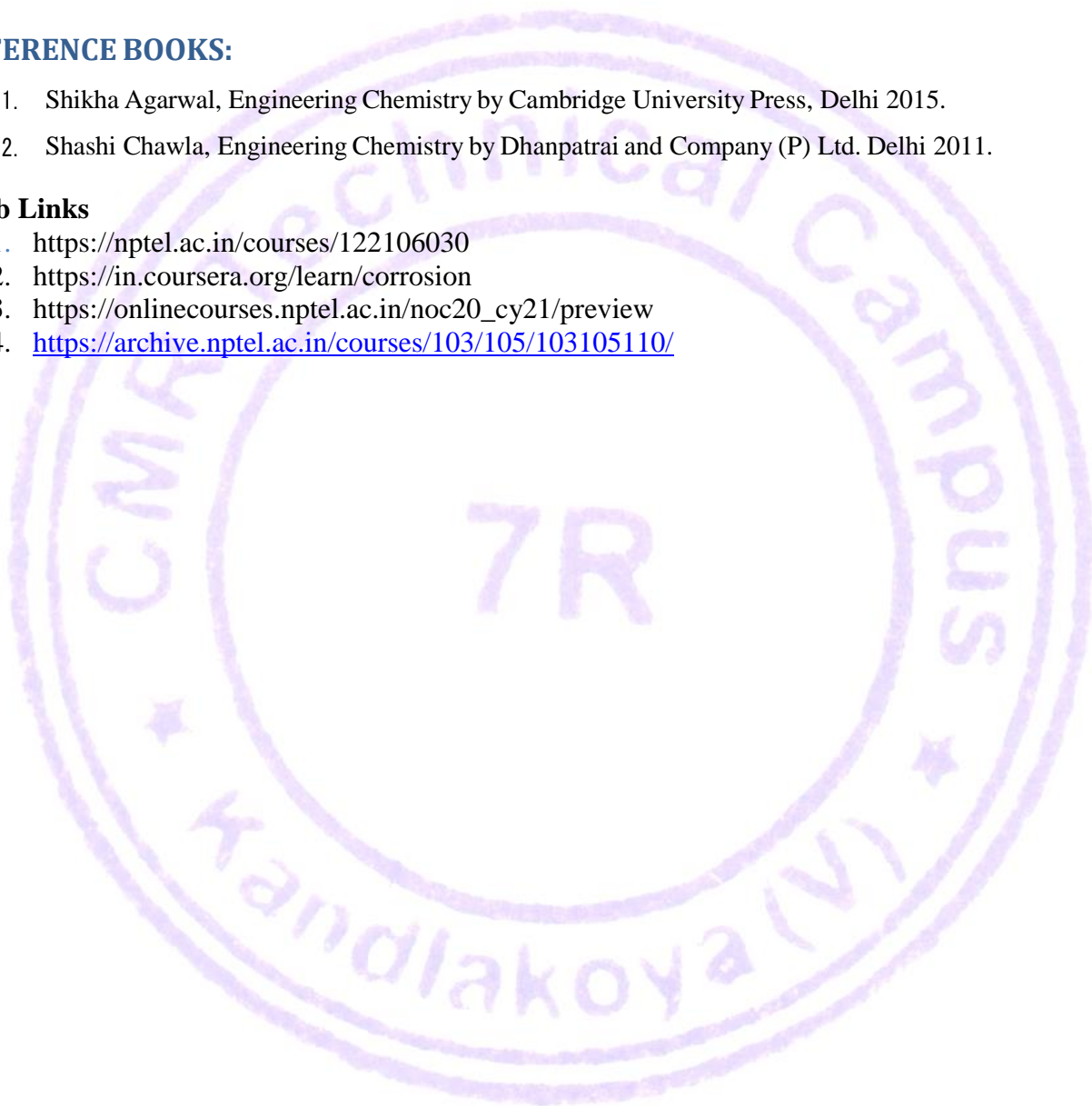
## TEXT BOOKS:

1. P.C. Jain and M. Jain, Engineering Chemistry by Dhanpatrai Publishing Company, 2010.

2. Rama Devi, Venkata Ramana Reddy and Rath, Engineering Chemistry by Cengage learning,2016.
3. Jaya Shree Anireddy, Textbook of Engineering Chemistry by Wiley Publications.
4. M. Thirumala Chary, E. Laxminarayana and K.Shashikala, A text book of Engineering

   Chemistry by Pearson Publications, 2021.

## REFERENCE BOOKS:

1. Shikha Agarwal, Engineering Chemistry by Cambridge University Press, Delhi 2015.

2. Shashi Chawla, Engineering Chemistry by Dhanpatrai and Company (P) Ltd. Delhi 2011.

### Web Links
1. https://nptel.ac.in/courses/122106030
2. https://in.coursera.org/learn/corrosion
3. https://onlinecourses.nptel.ac.in/noc20_cy21/preview
4. https://archive.nptel.ac.in/courses/103/105/103105110/

# Data Structures

| B. Tech. II Semester | L T P C |
|---|---|
| **Subject Code: 22CS203ES** | **3 0 0 3** |

**Prerequisites:** A Course on "Programming for problem solving".

**Course Objectives:**
1. Exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables.
3. Discussion of search trees.
4. Understand the sorting algorithms.
5. Introduces pattern matching algorithms

**Course Outcomes:**

**After completion of this course, the students will be able to:**
1. Explain the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
2. Discuss hashing and different collision resolve techniques.
3. Design programs using a variety of data structures including binary search trees, heaps trees and AVL-trees.
4. Design programs on sorting and graphs.
5. Apply different searching techniques on Non linear data structure

## UNIT–I                                                    [10 Lectures]
**Introduction to Data Structures**, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

## UNIT–II                                                    [6 Lectures]
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

## UNIT–III                                                   [8 Lectures]
Search Trees: Binary Search Trees, Definition, Implementation, Operations-Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations–Insertion, Deletion and Searching, Red –Black, Splay Trees.

## UNIT–IV                                                    [8 Lectures]
Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

**UNIT–V**                                                                 **[8 Lectures]**

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer – Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.
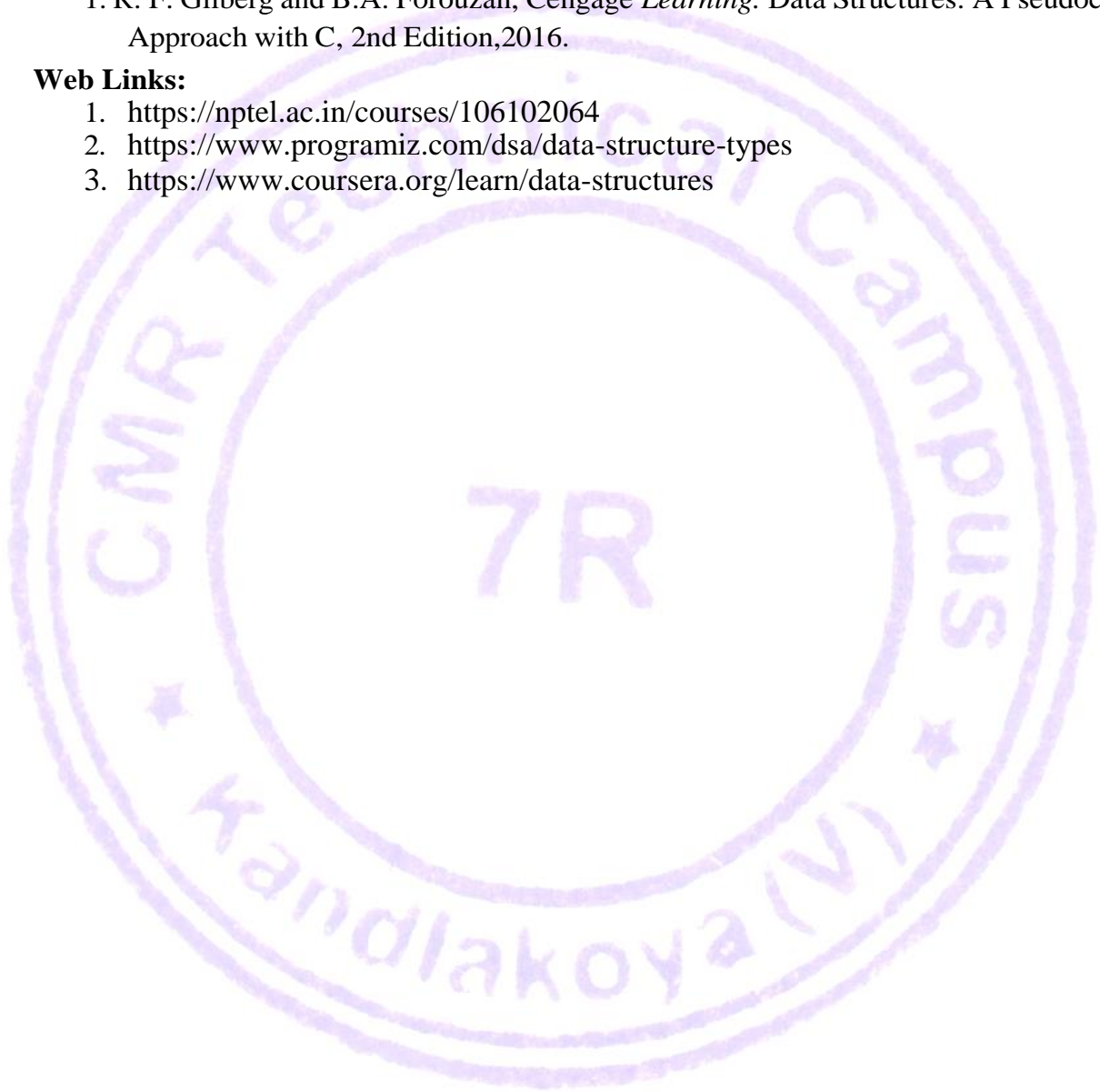
**TEXTBOOKS:**
1. E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*. Fundamentals of Data Structures in C, 2nd Edition,2008.
2. A. S. Tanenbaum, Y. Langsam, and M. J.Augenstein,PHI/Pearson Education. Data Structures using C ,2004.

**REFERENCE BOOKS:**
1. R. F. Gilberg and B.A. Forouzan, Cengage *Learning.* Data Structures: A Pseudocode Approach with C, 2nd Edition,2016.

**Web Links:**
1. https://nptel.ac.in/courses/106102064
2. https://www.programiz.com/dsa/data-structure-types
3. https://www.coursera.org/learn/data-structures

# Basic Electrical & Electronics Engineering

|  | L | T | P | C |
|---|---|---|---|---|

**B. Tech. I Semester**

**Subject Code: 22EC204ES**                                            3   1   0   4

**Prerequisites:**

**Course Objectives:**
1. To introduce the concepts of electrical circuits and its components.
2. To study and understand the different types of DC, AC single & three phase circuits.
3. To study and understand the different types of DC, AC machines and Transformers.
4. To introduce the concepts of diodes & transistors.
5. To impart the knowledge of various configurations, characteristics and applications.

**Course Outcomes:**

**After completion of this course, the students will be able to:**
1. Identify the basic DC electrical circuits.
2. Evaluate the basic single phase and three phase AC circuits.
3. Analyze the working principles of Electrical Machines.
4. Classify the concepts of diodes & Rectifiers.
5. Compare the knowledge of various transistor configurations, characteristics and applications.

**UNIT- I:**                                                      **[14 Lectures]**

**D.C. CIRCUITS**: Introduction, Types of elements, Definitions, Ohm's law and its limitations, Passive elements R-L-C, Energy sources-Ideal and practical, Series and Parallel combination of Resistances, Inductances and Capacitances, Star-Delta Transformation, Source transformation, Kirchhoff's Laws, Mesh analysis, Nodal analysis.

**UNIT-II:**                                                      **[12 Lectures]**

**A.C. CIRCUITS**: Representation of sinusoidal waveforms, Instantaneous value, Peak value, Average and RMS value, Form factor and Peak factor for sinewave, Rectifier output, Saw tooth and Square Waveforms, Phasor representation, Real power, Reactive power, Apparent power, Power factor, Analysis of single- phase ac circuits RL, RC, RLC series combination. Three phase balanced circuits, Voltage and current relationship in star and delta connections.
.

**UNIT – III:**                                                   **[14 Lectures]**

**TRANSFORMERS**: Construction, Types, Working principle of Single-phase transformer, EMF equation, Equivalent circuit, Losses in transformers, Efficiency and Condition for maximum efficiency.

**DC& AC Machines**: Construction, Working Principle of DC generator, EMF equation, Types, Working principle of DC motor, Torque equation, Three phase induction motor construction and working, Slip and Rotor current frequency.

**UNIT – IV:**                                                    **[10 Lectures]**

**DIODES**: Principle of Operation, Diode current equation, Volt-Ampere characteristics, Static and dynamic resistances, Diffusion and Transition capacitances. Half Wave Rectifier, Full Wave Rectifier-Center-Tap and Bridge Rectifier, Ripple factor, Rectification efficiency, Peak

Inverse Voltage, Transformer Utilisation Factor, Simple problems. Zener diode characteristics, Zener diode as voltage regulator.

**UNIT – V:** [10 Lectures]
**Bipolar junction Transistor:** Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Current amplification factor, Relation between α and β, Comparison of CE, CB and CC configurations. SCR Construction, Operation and V-I characteristics.

**TEXT BOOKS:**
1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. V.K. Mehta, Rohit Mehta, Principles of Electrical Engineering and Electronics – S.Chand Publications, 2nd Edition,2014.

**REFERENCE BOOKS:**
1. R. L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits – PEI/PHI, 9th Ed, 2006.
2. J. Millman and C. C. Halkias, SatyabrataJit, Electronic Devices and Circuits – TMH, 2/e, 1998.
3. William Hayt and Jack E. Kemmerly, Engineering circuit analysis- McGraw Hill Company, 6th edition,2012.
4. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
5. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

**Web Links:**
1. www.youtube.com/watch?v=vh_aCAHThTQ
2. www.electricaleasy.com/2014/03/electrical-transformer-basic.html
3. www.youtube.com/watch?v=Unh99Qn7CmI
4. www.youtube.com/watch?v=d_LOXUEFA-o
5. www.electricaleasy.com/2022/09/construction-and-working-of-dc-generator.html.

# Computer Aided Engineering Graphics

**B. Tech. II Semester**                                                      **L  T  P  C**

**Subject Code: 22ME205ES**                                             **1  0  2  2**

**Pre-requisites:** Computer Aided Engineering Graphics course of first year of study.
**Course Objectives:** To learn
1. To provide basic concepts in engineering drawing. To develop the ability of visualization of objects through technical drawings
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw projections of solids and pictorial views of solids and to draw surfaces development
   of solid for prisms, pyramids, cone and cylinder.
4. To draw isometric views of solids and orthographic projections of solids.
5. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products.

## Course outcomes:
### After completion of this course, the students will be able to:
1. Apply computer aided drafting tools to sketch the conventions and the methods of drawings, engineering curves and scales
2. Identify and draw the projections of points, lines and planes in different types of projections. manually and by using computer aided drafting tools
3. Analyze the need of projections of solids (prisms, pyramids, cone and cylinder) manually and by using computer aided drafting tools.
4. Evaluate and interpret engineering drawings for development of surfaces to Right Regular Solids-prism, manually and by using computer aided drafting tool.
5. Change the conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting tool.

### UNIT- I: INTRODUCTION TO ENGINEERING DRAWING                           [12 Lectures]
Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid. Scales – Plain and Diagonal. Introduction to CAD Software commands and practice.

### UNIT -II: ORTHOGRAPHIC PROJECTIONS                                     [12 Lectures]
Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. manually and by using computer aided drafting

### UNIT –III: PROJECTIONS OF SOLIDS                                       [12 Lectures]
Projections of Regular Solids – Prism, Cylinder, Pyramid and Cone. manually and by using computer aided drafting.

## UNIT- IV: DEVELOPMENT OF SURFACE [12 Lectures]

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone. manually and by using computer aided drafting

## UNIT –V: ISOMETRIC PROJECTIONS: [12 Lectures]

Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions –Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Conversion of Isometric Views to Orthographic Views and Vice-versa. manually and by using computer aided drafting

Note: - Internal exam and The End Semester Examination will be conducted by using Auto Cad Software.

## TEXTBOOKS:

1. N.D. Bhatt / Charotar, Engineering Drawing, Publisher: *Charotar* Publishing House · GenreJanuary 2019.
2. T. Jeyapoovan, Vikas: Engineering Drawing and graphics Using AutoCAD Third Edition S. Chand and company Ltd. January 2010.
3. N. S. Parthasarathy and Vela Murali/ Engineering Drawing /Oxford publications. 12th june 2015.
4. K Balaveera Reddy et al –Computer Aided Engineering Drawing, CBS Publishers. 2015.

## REFERENCE BOOKS:

1. M. B. Shah, B.C. Rane / Engineering Drawing, Pearson. 2009
2. K Balaveera Reddy et al – Computer Aided Engineering Drawing, CBS Publishers. 2015
3. Basant Agrawal and C M Agrawal, Engineering Drawing, Third Edition McGraw Hil.2019
4. K Balaveera Reddy et al – Computer Aided Engineering Drawing -CBS Publishers. 2015.

## WEBLINKS:

1. https://www.youtube.com/watch?v=ANEvQyt3PnU
2. https://www.youtube.com/watch?v=rp3swbAYZJU
3. https://www.youtube.com/watch?v=ga1ud9yQl4I
4. http://www.digimat.in/nptel/courses/video/105104148/L04.html
5. https://engineeringvideolectures.com/course/758

# Engineering Chemistry Laboratory

**B. Tech. II Semester**                                                      **L  T  P  C**

**Subject Code: 22CH206BS**                                              **0  0  2  1**

**Pre-requesities :** To bring adaptability to new developments in engineering chemistry lab and  acquire the knowledge in practical skills

**Course Objectives:**

The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. To perform estimations of acids and bases using conductometry and potentiometry methods.
3. To prepare polymers such as Bakelite and nylon-6.6 in the laboratory.
4. Learn skills related to the lubricant properties such as saponification value,surface tension and viscosity of oils.
5. Apply the skills in rate of corrosion to solve engineering problems.

**Course Outcomes:After completion of this course, the students will be able to:**

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Perform methods such as conductometry and potentiometry in order to find out the concentrations or      equivalence points of acids and bases.
3. prepare polymers like bakelite and nylon-6.6
4. Estimations of saponification value, surface tension and viscosity of lubricant oils.
5. Find the rate of corrosion of mild steel in various conditions.

**List of Experiments:**

I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
III. **Potentiometry:** Estimation of the concentration of an acid by Potentiometry Estimation of the      amount of $Fe^{+2}$ by Potentiomentry.

I. **Preparations:**

1. Preparation of Bakelite.
2. Preparation Nylon – 6.6

II. **Lubricants:**

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

III. **Corrosion:** Determination of rate of corrosion of mild steel in the presenceand absence of inhibitor.

**IV. Virtual lab experiments**

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

## REFERENCE BOOKS:

1. B. Ramadevi and P. Aparna, Engineering chemistry Lab manual for by S Chand Publications, New Delhi (2022).
2. Vogel's text book of practical organic chemistry 5th edition.
3. A.I. Vogel, Inorganic Quantitative analysis by ELBS Publications.
4. V.K. Ahluwalia, College Practical Chemistry by Narosa Publications Ltd. New Delhi (2007).

## Web Links

1. www.youtube.com/watch?v=FCQ26RQBZLg
2. https://www.youtube.com/watch?v=-GS6uoFf3qQ
3. https://www.youtube.com/watch?v=Y48UgKi33Ps
4. https://www.youtube.com/watch?v=TC1M-XDHfDI

# Data Structure Laboratory

**B. Tech. II Semester**                                                           **L T P  C**

**Subject Code: 22CS207ES**                                                    **0 0 2  1**

**Prerequisites:**  A Course on "Programming for problem solving".

## Course Objectives:

1. It provides an understanding of linear data structures such as stacks and queues.
2. It provides an understanding of  non linear data structures like tress and graphs.
3. It provides an understanding of linear and binary search algorithms.
4. It provides an understanding of sorting algorithms.

## Course Outcomes:

After completion of this course, the students will be able to:

1. Implement various linear data structures.
2. Implement various non  linear data structures.
3. Compare various searching and sorting algorithms.
4. Ability to implement trees and graphs traversals.

## LIST OF EXPERIMENTS

1. Write a program that uses functions to perform the following operations on single linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal

2. Write a program that uses functions to perform the following operations on double linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal

3. Write a program that uses functions to perform the following operations on circular linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal

4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers

5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers

6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort ii) Selection sort iii) Insertion sort

7. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search ii) Binary search

8. Write a program to implement the tree traversal methods.

9. Write a program to implement the graph traversal methods.

## TEXT BOOKS:

1. E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*. Fundamentals of Data Structures in C, 2nd Edition,2008.
2. A. S. Tanenbaum, Y. Langsam, and M. J.Augenstein,PHI/Pearson Education. Data Structures using C ,2004.

## REFERENCE BOOKS:

1. R. F. Gilberg and B.A. Forouzan, Cengage *Learning*. Data Structures: A Pseudocode Approach with C, 2nd Edition,2016.

## WEB LINKS:

1. https://nptel.ac.in/courses/106102064
2. https://www.programiz.com/dsa/data-structure-types
3. https://www.coursera.org/learn/data-structures
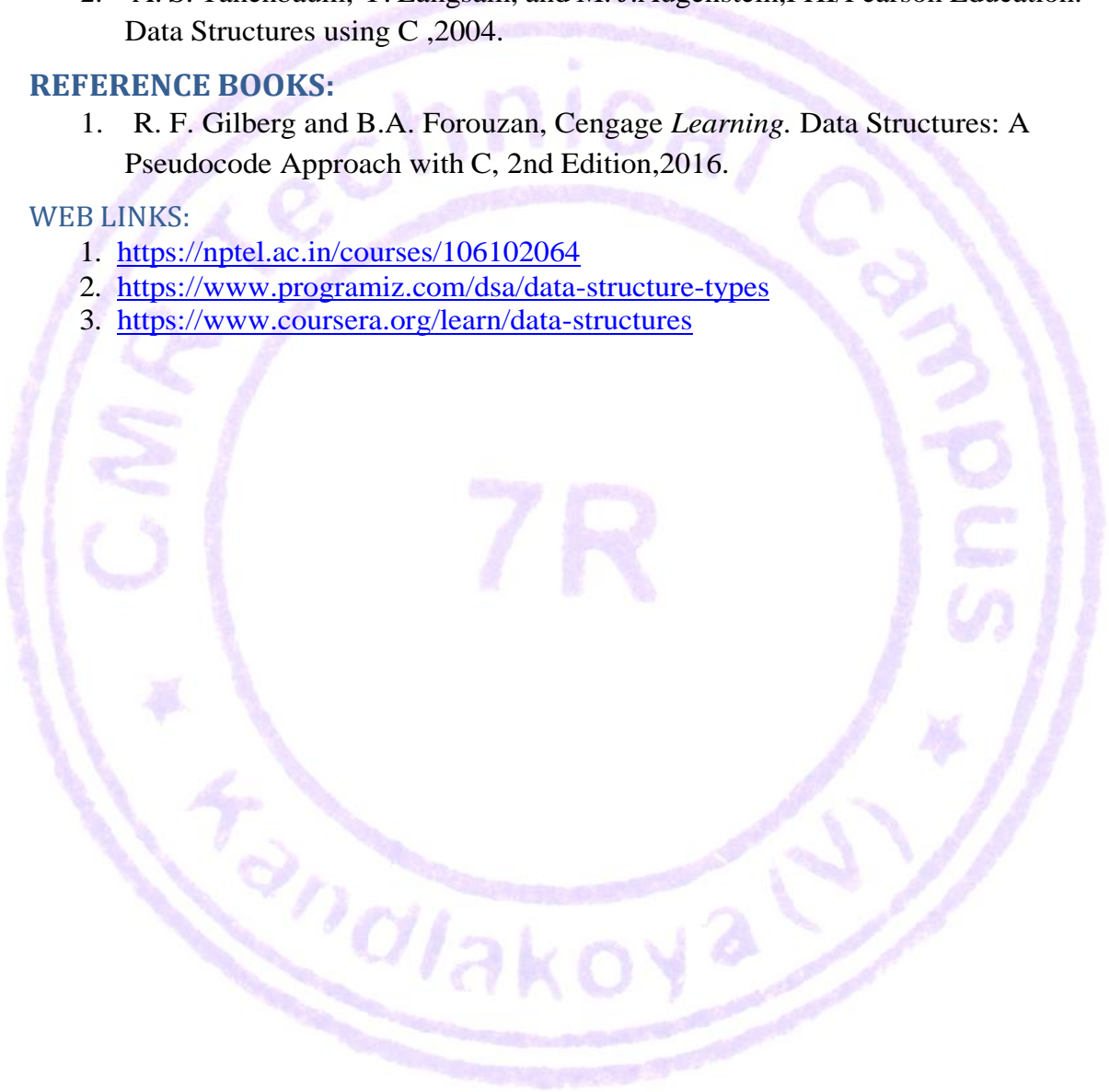
# Basic Electrical & Electronics Engineering Lab

**B.Tech. II Semester**

**Subject Code 22EC208ES**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**Prerequisites:** Mathematics

Corequisites: Basic Electrical and Electronics Engineering

**Course Objectives**:
1. To Analyze a given network by applying various electrical laws.
2. To Analyze the performance of single phase transformers.
3. To Analyze the performance of transformers, DC and AC machines.
4. To introduce the concepts of diodes and transistors.
5. To impart the knowledge of various types of Rectifiers.

**Course Outcomes:**

**After completion of this course, the students will be able to:**
1. Verify the Ohms law, KCL, KVL with practical approach.
2. Estimate the performance calculations of single phase transformers.
3. Analyze the Performance characteristics of DC and AC machines through various testing methods.
4. Compare the characteristics of different types of diodes and transistors.
5. Evaluate the performance of Rectifiers with and without filters.

## SECTION A: ELECTRICAL ENGINEERING:
1. Verification of Ohm's law.
2. Verification of KCL and KVL.
3. Brake test on DC Shunt motor.
4. Brake test on 3-phase Induction motor.
5. Load Test on Single-Phase Transformer.
6. Measurement of Voltage, Current and Real Power in Primary and Secondary circuits of a Single Phase Transformer.
7. No Load Characteristics of 3 phase Alternator.

## SECTION B: ELECTRONICS ENGINEERING:
1. 1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies iv) CRO
2. PN Junction Diode Characteristics A)Forward bias B) Reverse bias
3. Zener Diode CharacteristicsA)Forward bias B) Reverse bias
4. Input and Output characteristics of BJT in CE Configuration.
5. Half wave Rectifier without and with  Filters .
6. Full wave Rectifier without and with Filters .
7. Note: Total 10 experiments are to be conducted.

(Minimum Five experiments from PART-A, Five experiments from PART-B)

## TEXT BOOKS:
1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.

2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

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1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand, 2 nd Edition, 2019.
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3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.

**Web links: -**

1. .https://www.youtube.com/watch?v=Ki60DB0I3W4&list=PLwymdQ84KI-x0T05PcG6D_2rhbWV_O93B&index=2
2. https://www.youtube.com/watch?v=W-AqhZLm7h4
3. https://www.youtube.com/watch?v=UkH4CaAsG6Q
4. https://www.youtube.com/watch?v=Hfkd7UFSIF0
5. https://www.youtube.com/watch?v=i9wbWYtm2cI
6. https://www.youtube.com/watch?v=UdaATCmDfYU
7. https://www.youtube.com/watch?v=1IZIjIf3NDw
8. https://www.youtube.com/watch?v=X-i1MevYcpM
9. https://www.youtube.com/watch?v=syZgyPLHyp8
10. https://www.youtube.com/watch?v=QGawHsg4NpQ

# Environmental Science

**B. Tech. II Semester**                                                                                 **L  T  P  C**

**Subject Code: 22CH209MC**                                                                       **3  0  0  0**

**Prerequisites: None**

**Course Objectives:**
1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes: After completion of this course, the students will be able to:**
1. Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Analyze and synthesize scientific data to characterize and evaluate the status of atleast one type of ecological system and apply skills of measurement, spatial orientation, sampling, and data analysis to characterize natural resource phenomena
3. Create awareness on the basic philosophy of science, concepts and scope.
4. Evaluate consequences of human exposure to pollution and its impacts to environmental quality.
5. Comprehending the statutory and regulatory mechanisms pertaining to environment in India and understanding judicial response to environmental issues in India.

**UNIT-I**                                                                                                              **[10 Lectures]**
**Ecosystems:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnifications, ecosystem value, services and carrying capacity, Field visits.

**UNIT-II.**                                                                                                            **[7 Lectures]**
**Natural Resources:** Classification of Resources: Living and Non-Living resources, water resources: useand over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT-III**                                                                                                           **[7 Lectures]**
**Biodiversity And Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT-IV**                                                                                                           **[10 Lectures]**
**Environmental Pollution and Control Technologies:** Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of

modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater

Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and MontréalProtocol. NAPCC-GoI Initiatives.

**UNIT-V**                                                **[8 Lectures]**

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wildlife Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. **EIA:** EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects.Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Footprint, Life Cycle assessment (LCA), Lowcarbon lifestyle.

### TEXTBOOKS:
1. Erach Bharucha , Textbook of Environmental Studies for Undergraduate Courses, The Orient Black swan, 2$^{nd}$ edition , 1 January 2015.
2. R. Rajagopalan, Environmental Studies , Oxford University Press,3$^{rd}$ edition, April, 2015

### REFERENCE BOOKS:
1. Richard T. Wright, Environmental Science: towards a sustainable future , Benjamin Cummings Pub Co,13th edition, 17 January 2016.
2. Gilbert M. Masters and Wendell P. Ela, Environmental Engineering and science, Pearson, 3rd edition, 15 December 2006.
3. Daniel B. Botkin & Edward A. Keller, Environmental Science , Wiley publishing,8th edition,2012.
4. Anubha Kaushik, Environmental Studies , New age international publishers, 4th Edition, 1 January 2012
5. Dr. M. AnjiReddy , Textbook of Environmental Science and Technology ,BS Publications, 31 october 2014.
6. Y. Anjaneyulu , Introduction to Environmental Science , BS.Publications, 1 January 2004

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1. https://onlinecourses.nptel.ac.in
2. https://archive.nptel.ac.in
3. https://onlinecourses.swayam2.ac.in
4. https://onlinecourses.nptel.ac.in
5. https://onlinecourses.nptel.ac.in

# Electronic Devices and Circuits

**B.Tech. III Semester.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 22EC301PC**

**Pre-requisite:** Basic Electrical and Electronics Engineering

**Course Objectives:**
1. To know about Special purpose devices and it'sapplications.
2. To introduce biasing, stabilization concepts and compensation techniques.
3. To analyze the Small Signal low frequency BJTAmplifiers.
4. To Estimate parameter of multistage amplifiers of BJT and high frequencyanalysis of BJT.
5. To know the types of JFET characteristics, it's applications and to analyze various FET amplifiers.

**Course Outcomes: After completion of this course, the students will be able to:**
1. IllustrateSpecial purpose devices, characteristics and its applications.
2. Applythe concepts of biasing, stabilization and compensation techniques for transistor.
3. Identifyh-parameter for the single stage amplifiers of BJT at its low frequency.
4. Estimate the parameter of multistage amplifiers of BJT and Analyze BJT at high frequency.
5. Evaluate the various configuration of JFET and analyze its amplifier.

**UNIT – I**                                                                                                      **[8 Lectures]**
**Special purpose devices:** Principle of operation- SCR, Tunnel Diode, UJT and UJT as Relaxation oscillator, Photo diode, LED and Varactor diode.

**UNIT – II**                                                                                                     **[8 Lectures]**
**Transistor Biasing and Stabilization:** Need for biasing, DC and AC load lines, operating point, fixed bias, collector to base bias, self-bias techniques for stabilization, stabilization factors (S, S',S''), Thermal runaway and thermal stability.

**UNIT – III**                                                                                                    **[8 Lectures]**
**Analysis of Small Signal low frequency Amplifiers:** Transistor Hybrid model, Typical values of h- parameters in CE, CB and CC configurations, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of CE Amplifier- effect of coupling and bypass capacitors.

**UNIT – IV**                                                                                                    **[10 Lectures]**
**Multistage Amplifiers:** Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers- Cascade RC Coupled amplifiers and Darlington pair.
**Transistor at High Frequency:** Hybrid PI- model of Common Emitter transistor model, CE short circuit current gain (f$\alpha$), CE short circuit current gain with load and Gain-bandwidth product.

**UNIT – V**                                                                                                      **[8 Lectures]**
**Field Effect Transistor:** JFET- Construction, Principle of operation, Pinch-off Voltage, Volt-Ampere Characteristics, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor. MOSFET Characteristics in Enhancement and Depletion mode, Basic Concepts of MOS Amplifiers.
**FET Amplifiers:** Small Signal Model**,** Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers.

**TEXT BOOKS:**
1. Jacob Millman, Electronic Devices and Circuits, McGraw Hill Education, 4$^{th}$ Edition, 2015 .
2. Robert L. Boylestead, Louis Nashelsky, Electronic Devices and Circuits theory, Pearson, 11$^{th}$ Edition, 2009.

**REFERENCE BOOKS:**
1. Horowitz, The Art of Electronics, Cambridge University Press, 3$^{rd}$ Edition, 2015.
2. David A. Bell, Electronic Devices and Circuits, Oxford, 5$^{th}$ Edition, 2008.

**Web Links:**
1. https://www.electronics-tutorials.ws/diode/diode_2.html
2. http://fourier.eng.hmc.edu/e84/lectures/ch4/node3.html
3. http://nptel.ac.in/courses/117103063/11 by Dr. Chitralekha Mahanta, IIT Guwahati.

# Digital System Design

**B.Tech. III Semester.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 22EC302PC**

**Pre-requisite:** Basic Electrical and Electronics Engineering

**Course Objectives:**
1. To Compare common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To Distinguish the concepts of combinational logic circuits and sequential circuits.
4. To Realize Logic Gates using Diodes &Transistors.

**Course Outcomes: After completion of this course, the students will be able to:**
1. Compare the numerical information in different forms and Boolean Algebra theorems.
2. Apply the various simplification methods to Simplify the given Boolean function, Analyze and design various combinational logic circuits.
3. Learns Concepts of Sequential circuits, Simply and design various Registers and Counters
4. Build the various sequential state machines.
5. Illustrate logic families with logic gates Using Diodes & Transistors.

## UNIT - I                                                                 [8 Lectures]
**Number Systems:** Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Paritycheck code and Hamming code.

**Boolean Algebra:** Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, UniversalGates, Multilevel NAND/NOR realizations.

## UNIT – II                                                                [8 Lectures]
**Minimization of Boolean functions:** Karnaugh map method, don'tcare map entries, tabular method.

**Combinational Logic Circuits:** Adders, subtractors, multiplexers, de multiplexers, encoders, decoders and code converters.

## UNIT – III                                                              [10 Lectures]
**Sequential Circuits Fundamentals:** Basic Architectural comparison Of Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Conversion from one type of Flip-Flop to another.

**Registers and Counters:** Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters, Synchronous Modulo N – Counters.

## UNIT – IV                                                               [8 Lectures]
**Sequential Machines:** Finite State Machines, Synthesis of Synchronous Sequential Circuits-Serial Binary Adder, Sequence Detector, Parity-bit Generator, Finite state machine-capabilities and limitations, Mealyand Moore models.

**UNIT – V**                                                              **[8 Lectures]**
**Realization of Logic Gates Using Diodes & Transistors:** AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its comparison, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate, TTL open collector O/Ps, Tristate TTL.

**TEXT BOOKS:**
1. ZviKohavi & Niraj K. Jha, Switching and Finite Automata Theory,Cambridge, 3$^{rd}$ Edition 2010.
2. R. P. Jain, Modern Digital Electronics,Tata McGraw-Hill, 3$^{rd}$ Edition, 2007.

**REFERENCE BOOKS:**
1. Morris Mano, Digital Design, PHI, 4$^{th}$ Edition, 2006, .
2. Fredriac J. Hill, Gerald R.Peterson, Introduction to Switching Theoryand Logic Design, John Wiley& Sons Inc., 3rd Ed, 2009.
3. Charles H. Roth, Fundamentals of Logic Design,Cengage Learning, 5$^{th}$ Edition, 2004.
4. A Anand Kumar, Switching Theory and Logic Design,PHI, 3$^{rd}$ edition, 2016.

**WEB LINKS:**
1. http://nptel.ac.in/courses/117/106/117106086/ (By Prof. Goutam Saha, Electronics & Electrical Communication Engineering Dept, IIT Kharagpur).
2. www.nptelvideos.in/2012/12/digital-circuits-and-systems.html(By Prof. Santanu Chattopadhyay, Electronics & Electrical Communication Engineering Dept, IIT Kharagpur).
3. https://www.smartzworld.com/notes/switching-theory-and-logic-design-stld/.

# Signals and Systems

**B. Tech. III Semester.**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 22EC303PC**

**Pre-requisite:** Basic Electrical and Electronics Engineering

**Course Objectives:**
1. To learn signal analysis and the use of Sampling theorem.
2. To represent a given signal in frequency domain.
3. To gain proficiency in using Laplace transforms on continuous signals or systems.
4. To study Z-transforms and its properties.
5. To obtain the response of linear systems and remove noise by using correlation technique.

**Course Outcomes: After completion of this course, the students will be able to:**
1. Distinguish various signals and understand sampling theorem.
2. Express periodic signals in terms of Fourier series and non-periodic signals by Fourier transform.
3. Able to use Laplace transforms for continuous time signals and systems.
4. Apply Z- transforms for analysis of discrete- time signals and systems
5. Understand the signal transmission through linear systems.

**UNIT – I** **[8 Lectures]**
**Signal Analysis:** Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Classification of Signals.
**Sampling theorem**: Statement and proof of sampling theorem for band limited Signals, Nyquist rate, Effect of under sampling – Aliasing, Sampling Techniques: Impulse Sampling, Natural sampling, and Flat Top Sampling.

**UNIT – II** **[8 Lectures]**
**Fourier series:** Trigonometric Fourier Series, Exponential Fourier Series, Dirichlet's conditions, Fourier series representation of standard periodic signals.
**Fourier Transforms:** Deriving Fourier Transform from Fourier series, Properties of Fourier Transform, Fourier Transform of standard and arbitrary signals, Hilbert Transform.

**UNIT – III** **[8 Lectures]**
**Laplace Transform:** Laplace Transform, Inverse Laplace Transform, concept of Region of Convergence (ROC) for Laplace Transforms, Properties of ROC, Properties of Laplace Transform, Relation between L.T and F.T of a signal, Laplace Transform of standard signals.

**UNIT – IV** **[8 Lectures]**
**Z–Transform:** Concept of Z- Transform of a Discrete Sequence, Inverse Z-transform, Distinction between Laplace and Z Transforms, Relation between Z transform and Fourier transform of a discrete sequence. Region of Convergence in Z-Transform, Properties of ROC, Properties of Z-transforms.

**UNIT – V** **[8 Lectures]**
**Signal Transmission through Linear Systems:** Introduction to systems, properties of systems, Linear time invariant (LTI) system, Impulse response, Transfer Function, Distortion less transmission through a linear system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, BPF and BSF characteristics, Causality and Paley-Wiener criterion for physical realization, Concept of convolution in Time domain and Frequency domain.
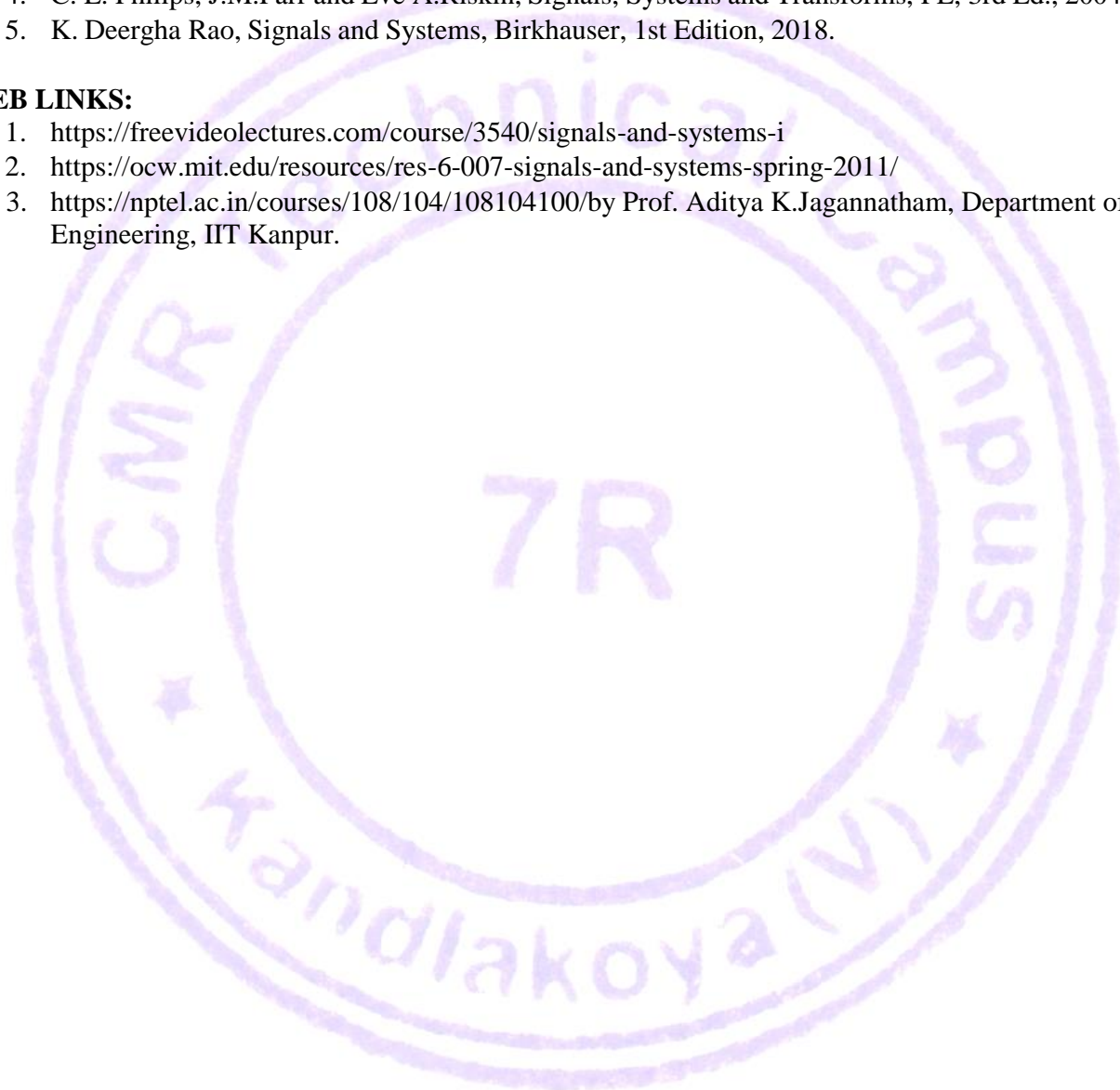
**TEXT BOOKS:**
1. B.P. Lathi,Signals, Systems & Communications, BSP, 2nd Edition,2003.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, Signals and Systems, Pearson, 2ndEd, 2015.

**REFERENCE BOOKS:**
1. Simon Haykin and Van Veen, Signals and Systems, Wiley, 2nd Ed, 2021.
2. A. Rama Krishna Rao, 2008, Signals and Systems, TMH.
3. Michel J. Robert, Fundamentals of Signals and Systems, MGH International Edition, 1st edition, 2008.
4. C. L. Philips, J.M.Parr and Eve A.Riskin, Signals, Systems and Transforms, PE, 3rd Ed., 2004.
5. K. Deergha Rao, Signals and Systems, Birkhauser, 1st Edition, 2018.

**WEB LINKS:**
1. https://freevideolectures.com/course/3540/signals-and-systems-i
2. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/
3. https://nptel.ac.in/courses/108/104/108104100/by Prof. Aditya K.Jagannatham, Department of Electrical Engineering, IIT Kanpur.

# Probability Theory and Stochastic Processes

**B. Tech. III Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 20EC304PC**

**Pre-requisite:** Mathematics

**Course Objectives:**
1. This gives basic understanding of random signals and processing
2. Utilization of Random signals and systems in Communications and Signal Processing areas.
3. To know the Spectral and temporal characteristics of Random Process.
4. To Learn the Basic concepts of Noise sources.

**Course Outcomes: After completion of this course, the students will be able to:**
1. Define the concepts of probability, theorems, density and distribution functions of various distributions.
2. Determine moments about the origin and central moments of random variables, know the significance of Central Limit Theorem.
3. Evaluate the temporal characteristics of Random processes.
4. Estimate the spectral characteristics of Random processes and characterize the response of linear systems to random signals.
5. Describe various noise sources in communication systems and acquire the knowledge of information theory.

## UNIT – I                                                                                  [8 Lectures]

**Probability & Random Variable:** Probability Definitions and Axioms, Random Experiments and Sample spaces, Events, Baye's Theorem and its proof, Random Variable - Definition, Conditions for a function to be a random variable, Distribution Function - Properties, Density Function - Properties. Vector Random Variables: Joint Distribution Function - Properties, Joint Density Function - Properties, Marginal Distribution and Density Functions, Statistical Independence.

## UNIT – II                                                                                [10 Lectures]

**Operations On Single & Multiple Random Variables – Expectations:** Expected Value of a Random Variable, Moments about the origin: Mean, Variance, and Correlation. Central Moments: Variance, and Covariance. Moment Generating Function – Properties, Characteristic Function - Properties, Random Variable Distributions: Gaussian Distribution, Uniform Distribution, Binomial Distribution, and Poisson Distribution. Sum of Two Random Variables, Central Limit Theorem. Linear Transformations of Gaussian Random Variables.

## UNIT – III                                                                               [8 Lectures]

**Stochastic Processes – Temporal Characteristics:** The Stochastic Process Concept and defintions, Classification of Stochastic Processes, Stationarity, Wide Sense Stationarity, Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function -Properties, Cross Correlation Function - Properties, Gaussian Random Process, Poisson Random Process.

## UNIT – IV                                                                               [8 Lectures]

**Stochastic Processes Spectral Characteristics:** The power Density Spectrum, Properties, Relationship between Power Density Spectrum and Autocorrelation Function, The Cross- Power Density Spectrum, Properties, Relationship between Cross-Power Density Spectrum and Cross-Correlation Function, Average Power of a Random Process.

**UNIT – V**												**[8 Lectures]**

**Noise Sources & Information Theory:** Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature and Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Mutual Information, Source coding: Huffman coding, Shannon Fano coding. Channel capacity Theorem.

**TEXT BOOKS:**
1. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles, TMH, 4th Edition,2001.
2. Taub and Schilling, Principles of Communication systems, TMH, 3rd Edition, 2007.

**REFERENCE BOOKS:**
1. Bruce Hajck, Random Processes for Engineers, Cambridge unipress, 1st Edition, 2015.
2. Athanasios Papoulis and S. Unnikrishna Pillai, Probability, Random Variables and Stochastic Processes, PHI, 4th Edition, 2002.
3. K. Murugesan, P. Guruswamy, Probability, Statistics & Random Processes, AnuradhaAgencies, 3rd Edition, 2003.
4. B.P. Lathi,Signals, Systems & Communications, BSP, 2nd Edition,2003.
5. S.P Eugene Xavier, Statistical Theory of Communication, New Age Publications, 1st Edition, 2003.

**Web Links:**
1. http://nptel.ac.in/courses/117105085/ - by Prof.M.Chakraborthy, IIT Khargpur.
2. https://ocw.mit.edu/courses/mathematics/18-445-introduction-to-stochastic- processes-spring-2015/Offered by MIT
3. https://onlinecourses.nptel.ac.in/noc19_ma30/preview - by Prof. S. Dharmaraja, IIT Delhi.

# Network Analysis

**B.Tech. III Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Subject Code: 22EC305ES**

**Pre-Requisites:** Basic Electrical and Electronics Engineering

**Course Objectives:**
1. To explainthe basic concepts of RLC circuits, network theorems and it's frequency domain analysis.
2. To understand the basics of magnetic circuits and network topology.
3. To know the behavior of the steady states and transient states in RLC circuits.
4. To studythe transfer function and network functions in S domain.
5. To Apply the two port network parameters.

**Course Outcomes: After completion of this course, the students will be able to:**
1. Illustrate the circuit using various theorems and frequency domain analysis of RLC series resonance circuit.
2. Analyze the knowledge of magnetic circuits and network topology.
3. Asses the Steadystate and transient states of RLC Circuits.
4. Interpret the network functions in S domain.
5. Design and analyze the knowledge of characteristics of the two port network parameters.

**UNIT – I** **[10 Lectures]**
**Network Theorems (DC Circuits only):** Super positiontheorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocitytheorem, Compensation theorem.
**Frequency Domain Analysis:** Series and parallel Resonance - Resonance curves, Bandwidth, qualityfactor.

**UNIT – II** **[8 Lectures]**
**Magnetic Circuits:** Self and Mutual inductances, co-efficient of coupling, dot convention, coupled circuits, equivalent T for Magneticallycoupled circuits.
**Network Topology:** Definition, Incident matrix, loop matrix, Basic cut-set and tie set matrices for planar networks and network equilibrium equations.

**UNIT – III** **[8 Lectures]**
**Transient and Steady State analysis**: RC, RL and RLC Circuits, Circuits with switches, step response, $2^{nd}$ order RLC Circuits, Root locus, damping factor, over damped, under damped, criticallydamped cases.

**UNIT – IV** **[8 Lectures]**
**Network Analysis using Laplace transform techniques** - RC, RL and RLC circuit response for step, impulse exponential excitation and periodic excitation.

**UNIT –V** **[8 Lectures]**
**Two port network parameters: Z**, Y, ABCD, h and g parameters, network function, driving pointand transfer functions – using transformed (S) variables, Poles and Zeros.

**TEXT BOOKS:**

1. Van Valkenburg, Network Analysis, Pearson, 3$^{rd}$ Edition, 2016,.
2. William Hayt and Jack E Kemmerly, Engineering Circuit Analysis, MGH, 8$^{th}$ Edition,1993.

**REFERENCE BOOKS:**

1. J. Edminister and M. Nahvi, Electric Circuits, Schaum's Outlines, McGraw Hill Education, 7$^{th}$ Edition, 2017.
2. JD Ryder, Networks, Lines and Fields, PHI, 2$^{nd}$ Edition,1999.
3. Ravish R Singh, Network Analysis and Synthesis, McGraw Hill education, 1$^{st}$ Edition, 2017.

**Web Links:**

1. https://nptel.ac.in/courses/108/105/108105159/ by Prof. Tapas Kumar Bhattacharya
2. http://ocw.mit.edu
3. www.allaboutcircuits.com
4. www.analyzethat.net

# Electronic Devices and Circuits Lab

**B.Tech. III Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Subject Code: 22EC306PC**

**Co-requisite:** Electronic Devices and Circuits

**Course Outcomes:**
Upon Completion of the course, students will be able to
1. Examine the performance of UJT.
2. Analyze the Q-Point in BJT and design of self-bias circuit.
3. Estimate the characteristics of BJT and its applications.
4. Evaluate the JFET characteristics and amplifiers.
5. Design and analyze the multistage amplifiers.

**List of Experiments:** *Perform any twelve experiments.*

1. UJT Characteristics and UJT as Relaxation Oscillator.
2. Perform an experiment to choose Q-point for a Transistor that operate in active region and observe the effect of external Load resistance on Q-point.
3. Design a Self-bias Circuit and determine the Q-point of the Transistor and its Stability factor by both simulation and realization with hardware components.
4. Obtain the I/O Characteristics of CB Configuration and calculate its h-parameters.
5. Obtain the I/O Characteristics of CE Configuration and calculate its h-parameters.
6. Verify frequency response of Common Emitter Amplifier Circuit.
7. Verify frequency response of Emitter Follower Circuit.
8. Obtain the Drain and Transfer characteristics of CS Configuration of JFET
9. Verify frequency response of CS amplifiers of JFET.
10. Verify frequency response of two stage RC Coupled amplifier
11. Practically prove that the Darlington pair has high input impedance.

**Major Equipment required for Laboratories:**
1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multi meters
5. Electronic Components

# Digital System Design Lab

**B.Tech. III Semester.**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**Subject Code: 22EC307PC**

**Co-requisite:** Digital System Design

**Course Outcomes:** On Completion of the course, students will be able to

1. Realization of Boolean Expressions using Gates and universal gates using appropriate experimentation setup.
2. Compare Various Adder & Subtractor using appropriate experimentationsetup. Combinational Circuits.
3. Design and realization of Various Mux & Comparator Combinational Circuits using appropriate experimentation setup.
4. Build   a Synchronous and Asynchronous counter using flip-flops using appropriate experimentation setup.
5. Create sequence detector-a finite state machine using appropriate experimentation setup.

**Note: Implement using digital ICs, all experiments to be carried out. List of Experiments -**

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder /Sub tractor Using Gates
5. Design and realization of a 4 – bit gray to Binaryand Binary to GrayConverter
6. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
7. Design and realization ofa Synchronous and Asynchronous counter using flip-flops
8. Design and realization of Asynchronous counters using flip-flops
9. Design and realization of8x1 MUX using 2x1MUX
10. Design and realization of4-bitcomparator
11. Design and Realization of a sequence detector-a finite state machine

**Major Equipment's required for Laboratories:**
1. 5 V Fixed Regulated Power Supply/ 0-5V or moreRegulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multi meter.

# Basic Simulation Lab

**B. Tech. III Semester.**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Subject Code: 22EC308PC**

**Co-requisite:** Signals & Systems

**Course Outcomes:** Upon completing this course, the students will be able to

1. Relate matrix operations, signals generation, convolution and correlation techniques, and perform various operations on signals/sequences.
2. Obtain the Response of Linear System and Verify its Properties.
3. Examine Gibbs Phenomenon, and Sampling Theorem.
4. Evaluate Fourier Transform, Laplace Transform and plot Pole-Zero Plot.
5. Determine Gaussian noise parameters, Analyze correlation techniques for noise removal, Periodic Signal Extraction, Wiener Khinchine Relations, and Wide Sense Stationarity of Random Processes.

**Note:**

- All the experiments are to be simulated using MATLAB or equivalent software

**List of Experiments:**

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Even and Odd Parts, Real and Imaginary Parts, Energy, and Average Power.
4. Convolution and Correlation of Signals and sequences.
5. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its linearity, Time Invariance, physical realizability and stability properties.
6. Gibbs Phenomenon Simulation.
7. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
8. Waveform Synthesis using Laplace Transform.
9. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
10. Generation of Gaussian noise ( Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
11. Verification of Sampling Theorem.
12. Removal of noise by Autocorrelation / Cross correlation.
13. Extraction of Periodic Signal masked by noise using Correlation.
14. Verification of Weiner-Khintchine Relations.
15. Checking a Random Process for Stationarity in Widesense.

**Major Equipment's required for Laboratories:**

1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-MATLAB or any equivalent simulation software

# Gender Sensitization Lab

**B.Tech. III Semester.**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 0 |

**Subject Code: 22EN309MC**

**Course Objectives:**
1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To introduce students to information about some key biological aspects of genders.
3. To expose the students to debates on the politics and economics of work.
4. To help students reflect critically on gender violence.
5. To expose students to more egalitarian interactions between men and women

**Course outcomes:** After completion of this course the student will be able to :
1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
3. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
4. Men and women students and professionals will be better equipped to work and live together as equals.
5. Students will develop a sense of appreciation of women in all walks of life.

## UNIT-I: UNDERSTANDING GENDER                                    [4 Lectures]
Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

## UNIT-II: GENDER ROLES AND RELATIONS                            [4 Lectures]
Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender RolesGender Roles and Relationships Matrix-Missing Women-Sex Selection and Its ConsequencesDeclining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

## UNIT-III: GENDER AND LABOUR                                     [4 Letures]
Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. - Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming.

## UNIT – IV: GENDER - BASED VIOLENCE                              [4 Lectures]
The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

## UNIT-V: GENDER AND CULTURE                                      [4 Lectures]
Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature-Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa ParksThe Brave Heart

**TEXT BOOKS:**
Writers: A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu
Published by : Telugu Academy, Telangana Government
Year: 2015

**REFERENCE BOOKS:**
  1. Dr Rajpal Singh, Dr Anupama Sihag, Gender Sensization: Issues and Challenges, Raj Publications 2019.

**WEB LINKS:**
  2. http://ncw.nic.in/sites/default/files/Booklet-%20Gender%20Sensitization_0.pdf
  3. 2.http://gmmrcg.in/Content/284_464_7.1.1%20weblink%20annual%20gender%20sensitization%20action%20plan.pdf

# Analog and Digital Communications

**B. Tech. IV Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 22EC401PC**

**Prerequisite:** Probability theory and Stochastic Processes

**Course Objectives:**
1. To develop ability to analyze system requirements of analog and digital communication systems.
2. To understand the generation, detection of various analog and digital modulation techniques.
3. To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of base band transmissions.

**Course Outcomes: After completion of this course, the students will be able to:**
Illustrates of various Amplitude modulation and demodulation techniques.
1. Explain various angle modulation and demodulation techniques
2. Acquire the knowledge about AM, FM Transmitters and Receivers
3. Evaluate the various Pulse Modulation Techniques.
4. Distinguish the concepts of Digital Modulation Techniques and Baseband transmission.

**UNIT – I**                                                                                                   **[8 Lectures]**
**Amplitude Modulation:** Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation.

**UNIT – II**                                                                                                 **[8 Lectures]**
**Angle Modulation:** Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de- emphasis.

**UNIT – III**                                                                                               **[8 Lectures]**
**Transmitters:** Classification of Transmitters, AM Transmitters, FM Transmitters
**Receivers:** Radio Receiver - Receiver Types - Tuned radio frequency receiver, super heterodyne receiver, Intermediate frequency, Image frequency, AGC, Comparison of AM and FM Receivers.
**Pulse Modulation:** Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.

**UNIT – IV**                                                                                             **[10 Lectures]**
**Pulse Code Modulation:** PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noisein PCM and DM.

**UNIT – V**                                                                                    **[10 Lectures]**
**Digital Modulation Techniques:** ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non- Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM, Probability of Error.
**Baseband Transmission of Digital Signal:** A Baseband Signal Receiver, ISI, Eye Diagrams.


**TEXTBOOKS:**
1. Simon Haykin, An Introduction to Analog and Digital Communications, John Wiley, 2$^{nd}$ Edition, 2015.
2. WayneTomasi, Electronics Communication Systems-Fundamentals through Advanced, PHI, 5$^{th}$ Edition, 2009.

**REFERENCE BOOKS:**
1. Herbert Taub, Donald L Schilling, Goutam Saha, Principles of Communication Systems, McGraw-Hill, 3$^{rd}$ Edition, 2008,.
2. Dennis Roddy and John Coolean, Electronic Communications, PEA, 4$^{th}$ Edition, 2004,.
3. George Kennedy and Bernard Davis, Electronics & Communication System, TMH, 5$^{th}$ Edition, 2011.
4. K. Sam Shanmugam, Digital and Analog Communication Systems, Wiley India Pvt Ltd, . 1$^{st}$ Edition, 2017**.**

**Web Links:**
1. http://nptel.ac.in/courses/117102059/ Prof. Surendra Prasad.
2. https://ict.iitk.ac.in/wp-content/uploads/EE320A-Principles-Of-Communication- CommunicationSystems-4ed-Haykin.pdf.
3. http://bayanbox.ir/view/914409083519889086/Book-Modern-Digital-And- AnalogCommunication-Systems-4th-edition-by-Lathi.pdf.
4. https://soaneemrana.org/onewebmedia/ELECTRONICS%20COMMUNICATION%20SYSTEM %20BY%20GEORGE%20KENNEDY.pdf

# Electronic Circuit Analysis

**B.Tech. IV Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 22EC402PC**

**Pre-requisite:** Electronic Devices and Circuits

**Course Objectives:**
1. To define concepts of various types of amplifiers using feedback techniques and analyze its characteristics.
2. To explain working principle of oscillator and working of their types.
3. To estimate parameter of large signal amplifiers and tuned amplifiers.
4. To learn the Concepts of Non-Linear wave shaping.
5. To construct various multi vibrators and understand the concepts of various sweep circuits. .

**Course Outcomes: After completion of this course, the students will be able to:**
Compare and Analyze Various Feedback Amplifiers.
1. Distinguish various types of LC, RC oscillators.
2. Evaluate Power and Tuned Amplifiers.
3. Design various circuits like Clippers and Clampers.
4. Create Multi vibrators and sweep generators.

**UNIT – I**                                                                                          **[8 Lectures]**
**Feedback Amplifiers:** Concepts of feedback – Classification of feedback amplifiers – General Characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current Shunt Feedback configurations.

**UNIT – II**                                                                                          **[8 Lectures]**
**Oscillators:** Condition for Oscillations, RC type Oscillators-RC phase shift and Wein-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stabilityof Oscillators, Crystal Oscillator.

**UNIT – III**                                                                                        **[10 Lectures]**
**Large Signal Amplifiers:** Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C Amplifiers.
**Tuned Amplifiers:** Introduction, Single Tuned Amplifier-Quality factor, frequency response of tuned amplifier, Concepts of Stagger Tuned and Synchronous Tuning.

**UNIT – IV**                                                                                        **[7 Lectures]**
**Non-Linear Wave Shaping:** Clipping circuits with diodes, clipping at two independent levels, transfer characteristics of clippers, Clamper- Types of Clampers, Operation, clamping circuit theorem.

**UNIT-V**                                                                                            **[9 Lectures]**
**Multivibrators**: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.
**Time Base Generators**: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.
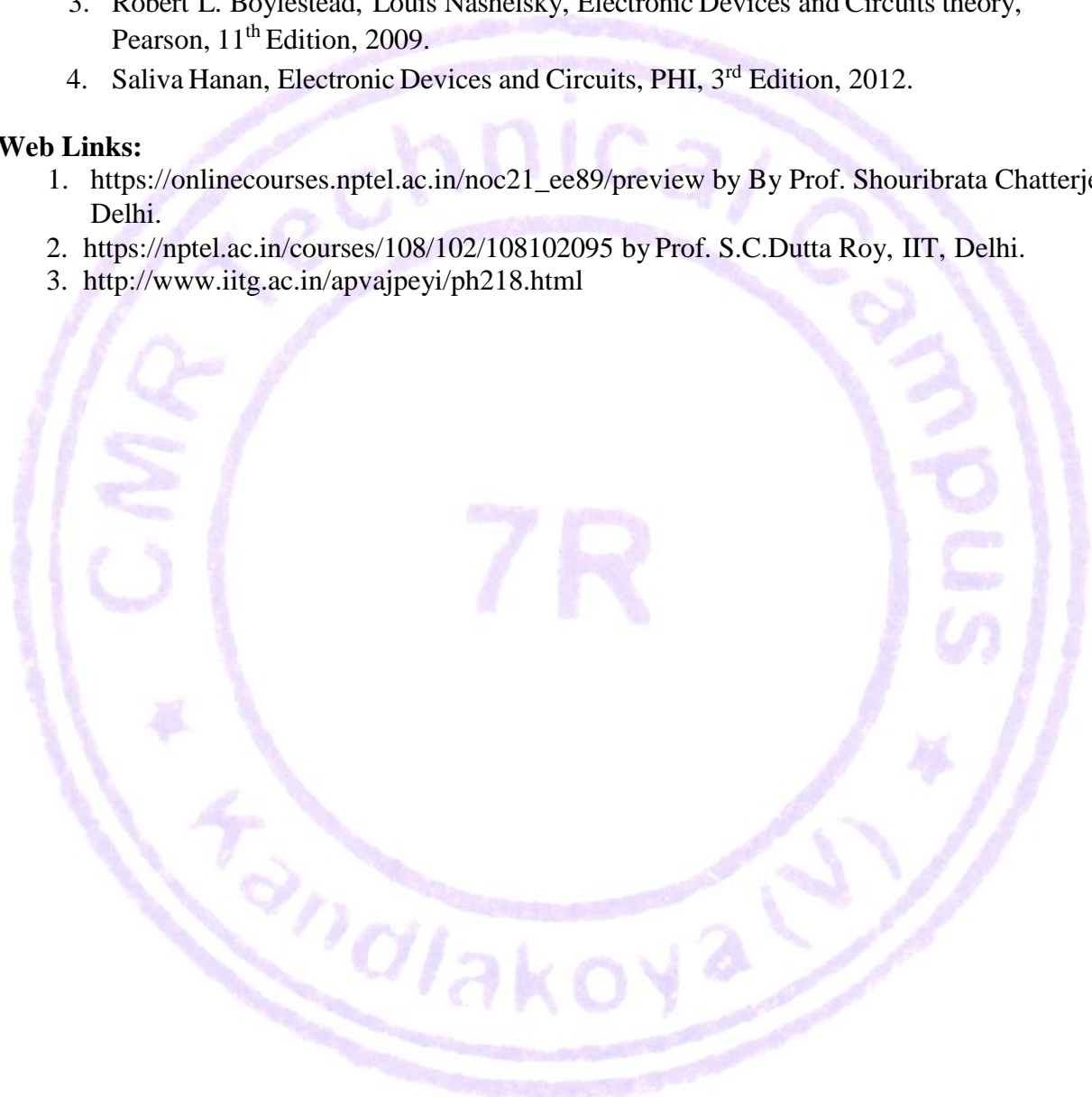
**TEXT BOOKS:**
1. Jacob Millman, Christos CHalkias, Integrated Electronics, McGraw Hill Education, 2nd Edition, 2017.
2. Thomas L. Floyd 2015, Electronic Devices Conventional and current version, Pearson.
3. Jacob Millman, Herbert Taub, 3rd Edition, Pulse, Digital and Switching Waveforms, McGraw Hill.

**REFERENCE BOOKS:**
1. David A. Bell, Pulse, Switchingand Digital Circuits, Oxford UniversityPress, 5th Edition, 2015.
2. David A. Bell, Electronic Devices and Circuits, Oxford UniversityPress, 5th Edition, 2015.
3. Robert L. Boylestead, Louis Nashelsky, Electronic Devices and Circuits theory, Pearson, 11th Edition, 2009.
4. Saliva Hanan, Electronic Devices and Circuits, PHI, 3rd Edition, 2012.

**Web Links:**
1. https://onlinecourses.nptel.ac.in/noc21_ee89/preview by By Prof. Shouribrata Chatterjee, IIT, Delhi.
2. https://nptel.ac.in/courses/108/102/108102095 by Prof. S.C.Dutta Roy, IIT, Delhi.
3. http://www.iitg.ac.in/apvajpeyi/ph218.html

# Numerical Methods and Complex Variables

**B. Tech. IV Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 22MA403BS**
**Pre-requisites:** Mathematics courses of first year of study.

**Course Objectives:** To learn
1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
2. Various numerical methods to find roots of an equation and concept of finite differences and to estimate the value for the given data using interpolation.
3. How to solve ordinary differential equations and integrals using numerical techniques
4. Differentiation and integration of complex valued functions.
5. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.

**Course outcomes:** After learning the contents of this paper the student must be able to

1. Express any periodic function in terms of sine and cosine
2. Find the root of a given polynomial and transcendental equations and Estimate the value for the given data using interpolation
3. Find the numerical solutions for a given first order ODE's
4. Analyze the complex function with reference to their analyticity.
5. Complex integration using Cauchy's integral and residue theorems.

## UNIT-I: Fourier Series & Fourier Transforms:                                        10 Lectures
Fourier series - Dirichlet's Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.(CO1,T1,R1)

## UNIT-II: Numerical Methods-I                                                      10 Lectures
Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method.
Finite differences: forward differences, backward differences, central differences, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.(CO2,T2)

## UNIT-III: Numerical Methods-II                                                    8 Lectures
Numerical integration: Trapezoidal rule and Simpson's 1/3rd  and 3/8th rules.
Ordinary differential equations: Taylor's series, Picard's method, Euler method and Runge-Kutta method of fourth order for first order ODE(CO3,T2)

## UNIT-IV: Complex Differentiation                                                  10 Lectures
Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs)(CO4,T1,T3)

## UNIT-V: Complex Integration:                                                      10 Lectures
Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Residues, Cauchy Residue theorem.(CO5,T1,T3)

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36$^{th}$ Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. T.K.V.Iyengar, B.Krishna Gandhi, Engineering Mathematics,S.Chand Publishers.

**REFERENCE BOOKS:**

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9$^{th}$ Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7$^{th}$ Edition, Mc-Graw Hill, 2004.

# Electromagnetic Waves and Transmission Lines

| **B.Tech. IV Semester** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|
|  | **3** | **0** | **0** | **3** |

**Subject Code: 22EC404PC**

**Pre-requisite:** Applied Physics

**Course Objectives:**
1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. To study the propagation, reflection and transmission of plane waves in bounded and unbounded media.

**Course Outcomes: After completion of this course, the students will be able to:**

Learn and Evaluate the problems of electrostatic fields.
1. Solve the problems of magneto static fields and boundary condition using Maxwell's equations.
2. Apply the concept of electromagnetic wave propagation in different media.
3. Evaluate the concept of transmission lines and their applications.
4. Design and analyze various impedance matching techniques.

**UNIT – I**                                                          **[8 Lectures]**
**Electrostatics:** Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density. Convection and Conduction Currents, Dielectric Constant, Isotropic and HomogeneousDielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.

**UNIT – II**                                                          **[10 Lectures]**
**Magneto statics:** Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.
**Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

**UNIT – III**                                                          **[8 Lectures]**
**EM Wave Characteristics:** Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization. Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

**UNIT – IV**                                                                                    **[8 Lectures]**
**Transmission Lines - I:** Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phaseand Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Types of Distortion, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.

**UNIT – V**                                                                                    **[8 Lectures]**
**Transmission Lines – II:** Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations, Smith Chart – Configuration and Applications, Single Stub Matching.

**TEXTBOOKS:**
1. Matthew N.O. sadiku and S.V. Kulkarni, Principles of Electromagnetics, Oxford University Press, Aisan Edition, 6$^{th}$ Edition, 2015.
2. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating Systems, PHI, 2$^{nd}$ Edition, 2000.
3. Umesh Sinha, Satya Prakashan, Transmission Lines and Networks, (Tech. India Publications), New Delhi, 2001.

**REFERENCE BOOKS:**
1. William H. Hayt Jr. and John A. Buck, Engineering Electromagnetics McGrawHill, 8$^{th}$ Edition 2014.
2. Nathan Ida, Engineering Electromagnetics, Springer (India) Pvt. Ltd, New Delhi 2$^{nd}$ Edition,2005.
3. G.Sashibhushana Rao, Electromagnetic field theory and transmission lines, Wiley India, 2$^{nd}$ Edition, 2012.
4. JD Ryder, Networks, Lines and Fields, PHI, 2$^{nd}$ edition, 1999.

**Web Links:**
1. https://nptel.ac.in/courses/108106157NPTEL Course on "Transmission lines and electromagnetic waves",IIT Madras, Dr. Ananth Krishnan.
2. https://nptel.ac.in/courses/117101056NPTEL Course on "Transmission Lines and EM Waves", IITBombay, Prof. R.K. Shevgaonkar.
3. https://nptel.ac.in/courses/117103065 NPTEL Course on "Electromagnetic fields" , IIT Guwahati, Dr.RatnajitBhattacharjee.

# Database Management Systems

**B.Tech. IV Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Subject Code: 22EC405PC**

**Course Objectives:**
1. To understand the basic concepts and the applications of data base systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

**Course Outcomes:** Upon completing this course, the student will be able to
1. Gain knowledge of fundamentals of DBMS and its applications.
2. Understand the concepts of relational models.
3. Master the basics of SQL for retrieval and management of data.
4. Be acquainted with the basics of transaction processing and concurrency Control.
5. Familiarity with database storage structures and access techniques.

**UNIT – I:**                                                                                         **[8 Lectures]**
**Database System Applications:** A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.
**Introduction to Database Design**: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

**UNIT – II:**                                                                                        **[8 Lectures]**
**Introduction to the Relational Model**: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views, Relational Algebra, Tuple relational Calculus, Domain relational calculus.

**UNIT – III:**                                                                                      **[10 Lectures]**
**SQL: Queries, Constraints, Triggers:** form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.
**Schema Refinement**: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

**UNIT – IV:**                                                                                       **[8 Lectures]**
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

**UNIT – V:**                                                                                        **[8 Lectures]**
Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.
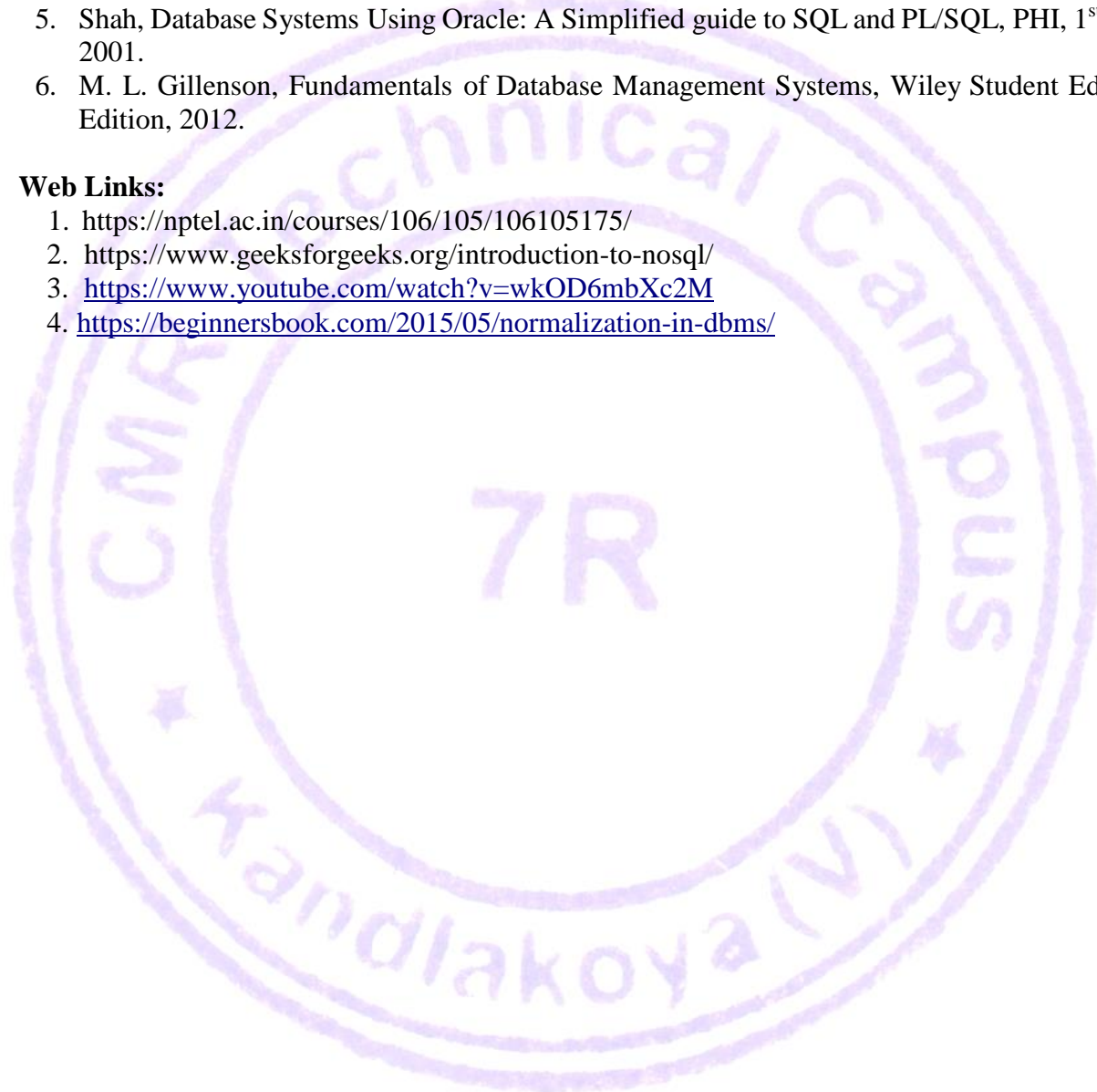
**TEXT BOOKS:**
1. Raghurama Krishnan, Johannes Gehrke, Database Management Systems, Tata Mc GrawHill 3$^{rd}$ Edition, 2007.
2. Silberschatz, Korth, Database System Concepts, Mc Graw hill, 5$^{th}$ edition, 2005.

**REFERENCE BOOKS:**
1. Peter Rob & Carlos Coronel, Database Systems design, Implementation, and Management, Thomson/Course Technology, 7$^{th}$ Edition, 2007.
2. Elmasri Navrate, Fundamentals of Database Systems, Pearson Education, 6$^{th}$ Edition, 2007.
3. C. J. Date, Introduction to Database Systems, Pearson Education, 8$^{th}$ Edition, 2003.
4. S.Shah and V. Shah, Oracle for Professionals, The X Team SPD, 1$^{st}$ Edition, 2008.
5. Shah, Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, PHI, 1$^{st}$ Edition, 2001.
6. M. L. Gillenson, Fundamentals of Database Management Systems, Wiley Student Edition, 2$^{nd}$ Edition, 2012.

**Web Links:**
1. https://nptel.ac.in/courses/106/105/106105175/
2. https://www.geeksforgeeks.org/introduction-to-nosql/
3. https://www.youtube.com/watch?v=wkOD6mbXc2M
4. https://beginnersbook.com/2015/05/normalization-in-dbms/

# Analog and Digital Communications Lab

| **B.Tech. IV Semester** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|
| | **0** | **0** | **2** | **1** |

**Subject Code: 22EC406PC**

**Co-requisite:** Analog and Digital Communications

**Course Outcomes:** At the end of the course, the student will be able to:
1. Examine different AM and FM Modulation & Demodulation Technique using appropriate experimentation setup.
2. Design Multiplexing and De Multiplexing Techniques using appropriate experimentation setup.
3. Distinguish different Pulse Modulation Techniques using appropriate experimentation setup.
4. Create and analyze different Shift Keying Techniques using appropriate experimentation setup
5. Build and analyze Quadrature Shift Keying Techniques using appropriate experimentation setup.

**Note:**
- Minimum 12 experiments should be conducted:

**List of Experiments:**
1. (i) Amplitude modulation and demodulation (ii) Spectrum analysis of AM
2. (i) Frequency modulation and demodulation (ii) Spectrum analysis of FM
3. DSB-SC Modulator &Detector
4. SSB-SC Modulator & Detector (Phase Shift Method)
5. FrequencyDivision Multiplexing & De multiplexing
6. Pulse Amplitude Modulation &Demodulation
7. Pulse Width Modulation &Demodulation
8. Pulse Position Modulation &Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. FrequencyShift Keying: Generation and Detection
12. BinaryPhase Shift Keying: Generation and Detection
13. Generation and Detection (i) DPSK (ii) QPSK

**MajorEquipment's required forLaboratories:**
1. CROs:20MHz
2. Function Generators:2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies:0-30V
5. Trainer Kits

# Electronic Circuits Analysis Lab

**B.Tech. IV Semester**                                                     **L    T    P    C**
                                                                            **0    0    2    1**

**Subject Code: 22EC407PC**

**Co-requisite:** Electronic Circuits Analysis

**Course Outcomes:** At the end of the course, the student will be able to:
1. Analyze, design to extend and comprehend the concepts of circuit modeling to design linear & non-linear wave shaping.
2. Implement analog electronic circuits using BJT and observed the application.
3. Estimate performance of power amplifiers such as class-A and Class-B power amplifiers.
4. Design time base generators using BJTs.
5. Compare multi vibrators for various applications.

**Note:**
- Minimum 12 experiments should be conducted on hardware and * Marked experiments must be simulated on Software.

**List of Experiments:**
1. Current Shunt Feedback Amplifier Circuit (*)
2. Voltage Series Feedback Amplifier Circuit (*)
3. RC phase shift oscillator *
4. Hartley and Colpitts oscillators
5. Class B Complementary& SymmetryPower Amplifiers *
6. RC high pass circuit as differentiator (Square wave input) *
7. RC low pass circuit as integrator (Square wave input)
8. Types of Clippers at different reference voltages
9. Types of Clampers at different reference voltages
10. Bistable Multi vibrator.
11. Design a Monostable Multi vibrator
12. Design an Astable Multivibrator
13. The output voltage waveform of Miller Sweep Circuit*

**MajorEquipment required for Laboratories:**
1. Regulated Power Suppliers,0-30V
2. 20 MHz, Dual Channel Cathode RayOscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters
5. Electronic Components/Trainer Kits.
6. Computer System
7. Simulation Software-Multisim or any equivalent simulation software

# Database Management Systems Lab

| **B.Tech. IV Semester** | **L** | **T** | **P** | **C** |
|---|---|---|---|---|
| | **0** | **0** | **2** | **1** |

**Subject Code: 22EC408PC**

**Co-requisite:** Database Management Systems

**Course Outcomes:**

1. Design the database with E-R Model.

2. Analyze Normalization and DDL, DML Commands.

3. Design the database schema using SQL commands.

4. Analyze the use of Triggers.

5. Apply procedures cursors and triggers using SQL.

**LIST OF EXPERIMENTS:**

1. Concept design with E-R Model

2. Relational Model

3. Normalization

4. Practicing DDL commands

5. Practicing DML commands

6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)

7. Queries using Aggregate functions, GROUPBY, HAVING and Creation and dropping of Views.

8. Triggers (Creation of insert trigger, delete trigger, update trigger)

9. Procedures

10. Usage of Cursors

# Constitution of India

**B.Tech. IV Semester**

| L | T | P | C |
|---|---|---|---|
| **3** | **0** | **0** | **0** |

**Subject Code: 22EN410MC**

**Prerequisites:** None

**Course Objectives:**

1. Introduction of constitution and it's evolution.
2. To know the fundamentals of Constitution
3. To analyse the fundamental rights and duties of Indian constitution
4. To know the governance of government and administration
5. To appraise the role organs of government.

**Course Outcomes:** After Completion of this course, the students will be able to:

1. Outline the evolution of Constitution.
2. Relate constitutional fundamentals with the present Era.
3. Analyse Liberalism Federalism and Socialism.
4. Infer the knowledge of Administration and Governance.
5. Appraise and address the role of governments.

**UNIT-1**                                                                            **[5 Lectures ]**

History of Making of the Indian Constitution-History of Drafting Committee.

**UNIT- 2**                                                                          **[5 Lectures]**

Philosophy of the Indian Constitution-Preamble Salient Features

**UNIT- 3**                                                                          **[3 Lectures ]**

Contours of Constitutional Rights&Duties-FundamentalRights

- Right to Equality
- RighttoFreedom
- Right against Exploitation
- RighttoFreedomofReligion
- CulturalandEducationalRights
- RighttoConstitutionalRemedies
- DirectivePrinciplesofStatePolicy
- FundamentalDuties

.

**UNIT-4**                                                                           **[6 Lectures ]**

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications , Powers and Functions

**UNIT -5**                                                                  **[6 Lectures]**
Local Administration: District's Administration head: Role and Importance, Municipalities:Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position androle. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grassroot democracy, Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

**Suggested Reading:**
1. Dr. M.V. Pylee India's Constitution, 16th Edition, S. Chand 2016.

2. Dr. S. N.Busi, Dr.B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

3. M. P.Jain, Indian Constitutional Law, 7thEdn., Lexis Nexis, 2018.

4. D.D. Basu, Introduction to the Constitution of India, 23rd Edn Lexis Nexis,2018.

**Web Links:**

https://youtu.be/4tI4QXhzqNU

https://youtu.be/TXhSrKJ1ahk

https://www.youtube.com/live/0FAdfh6NVtA?feature=share

https://youtu.be/vq2Q1_v6TNU