ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Guwahati

Course Structure and Syllabus

(From Academic Session 2018-19 onwards)

B.Tech 1st Semester (Group A)

For the branches:

- **Civil Engineering (CE)**
- **Mechanical Engineering (ME)**
- **Chemical Engineering (ChE)**
- **Industrial and Production Engineering (IPE)**

NOTE: Three weeks Mandatory Induction Program need to be done before the commencement of the B.Tech 1st semester classes as per the AICTE mandate

Mandatory Induction Program

3 weeks duration
• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

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B.Tech 1st Semester (Group A)

Semester I/ B.TECH

NOTE: Three-weeks mandatory Induction programme is to be done before the commencement of the classes as per the AICTE mandate

Sl. No.	Sub-Code	Subject	Hours per Week			Credits
			L	T	P	C
Theory						
1	CY181101	Chemistry-101	3	1	0	4
2	MA181102	Mathematics-I	3	1	0	4
3	CS181106	Problem Solving through Programming using C	2	0	2	3
4	EE181107	Basic Electrical Engineering	3	0	0	3
5	HS181108	Communication and Professional Skill	1	0	2	2
Practical						
1	CY181111	Chemistry-101 Lab	0	0	2	1
2	EE181117	Basic Electrical Engineering Lab	0	0	2	1
		TOTAL	12	2	8	**18**
Total Contact Hours per week : 22						
Total Credits: 18						

Course Code	Course Title	Hours per week L-T-P	Credit C
CY181101	Chemistry-101	3-1-0	4

COURSE OBJECTIVES

To introduce specific fundamental as well as applied concepts of Chemistry relevant for the study of topics in different branches of Engineering.

MODULE 1: Atomic Structure (5 Lectures)

Schrodinger's wave equation, Physical significance of Ψ and Ψ^2, Hydrogen atom wave Functions-Radial and Angular wave function, Eigen value, Eigen function, Molecular orbital theory-electronic configurations of molecules in terms of the MO-Homonuclear diatomic molecule, Heteronuclear diatomic molecule. (Eg. CO, NO)

MODULE 2: Polymer Chemistry (6 Lectures)

Classification, Functionality, Determination of molecular weights, Polydispersity index (PDI). Types of polymerization (Addition and Condensation). Structure-property-application of few commodity polymers (eg. PE, PP, PS, PMMA, PVC, Isoprene), Biopolymer-properties and its applications (polylactic acid), Conducting polymer-properties and its applications (polyacetylene).

MODULE 3: Nanochemistry (5 Lectures)

Introduction, Synthesis of nanomaterials (Top-down and Bottom-up approach). Fullerenes, Carbon nanotube (Characteristic, properties & application), Nanowire, Application of Nanomaterial in catalysis, Medicine, Energy science, Bio nanomaterials.

MODULE 4: Sustainable Chemistry (6 Lectures)

Principles of green chemistry, Idea of green synthesis, Carbon footprint and sequestration, Carbon trading. Brief idea of alternative solvents–Water, ionic liquids, supercritical fluid system (Carbon dioxide), Waste management**:** Solid, electronic & industrial wastes, Waste management procedures and relevant standards.

MODULE 5: Corrosion Science (6 Lectures)

Definition and scope of corrosion. Dry chemical corrosion and electrochemical corrosion and their mechanisms. Types of electrochemical corrosion (Differential aeration, Galvanic, Concentration cell), Typical electrochemical corrosion like Pitting, Inter-granular, Waterline. Factors affecting corrosion, Protection against corrosion.

MODULE 6: Instrumental Methods of Chemical Analysis (8 Lectures)

Spectroscopy: Principle of spectroscopy, Principle and applications of UV-Visible spectroscopy. Applications of Flame photometry, Atomic absorption spectroscopy, Infrared spectroscopy, NMR spectroscopy, Mass spectroscopy. Principle and applications of different Chromatographic Techniques-Gas, HPLC, GPC.

MODULE 7: Advanced Engineering Materials (6 Lectures)

Cement (Raw materials, chemical composition, setting and hardening of cement), Refractories (Classification and properties), Lubricants (Types of lubricants, Properties, Mechanism of lubrication)

Text Book/ Reference Books:

1. Engineering Chemistry-Jain & Jain (Dhanpat Rai & Company)
2. Engineering Chemistry-Shashi Chawla (Dhanpat Rai & Company)
3. Industrial Chemistry-B. K. Sharma
4. A text book of Engineering Chemistry-Dr S. Rattan
5. Wiley Engineering Chemistry
6. Atomic Structure and Chemical bond-Manas Chandra (TMH edition)
7. Quantum Chemistry-B.K. Sen
8. Quantum Mechanics-L. Pauling & E. Wilson (McGraw Hill Book Company)
9. Physical Chemistry-P. W. Atkins (Oxford University Press)
10. Advance Inorganic Chemistry- Cotton et. Al. (John Willey)
11. Inorganic Chemistry-Shriver, Atkins, Langford (ELBS)
12. Green Chemistry-Paul T Anastas, John C. Warner
13. Introduction to Polymers-R. J. Young
14. Polymer Science-V.R.Gowarikar (New Age International)
15. Fundamentals of Molecular Spectroscopy-C. N. Banwell & E. N. McCash
16. Atomic & Molecular Spectroscopy-Chatwal & Anand (Himalayan Publishing House)

Course Outcome: After successful completion of the course, the students will be able:

CO1: To apply molecular orbital theory along with electronic configuration on the basis of Schrodinger wave equation for simple homonuclear and heteronuclear diatomic molecules (NO, CO).

CO2: To illustrate the different aspects of polymer chemistry and its uses in different purposes along with brief idea of nanomaterials as well as sustainable chemistry with applications.

CO3: To apply the idea of corrosion along with control and preventive measures.

CO4: To apply the fundamental principles and applications of analysis using UV-Visible, Flame photometry, AAS, IR, NMR, mass spectroscopy and chromatography.

CO5: To infer about engineering materials e.g. cement, refractories with lubricants and their properties and applications.

Course Code	Course Title	Hours per week L-T-P	Credit C
MA181102	**Mathematics-I**	**3-1-0**	**4**

CALCULUS AND LINEAR ALGEBRA

MODULE 1: Calculus (8 lectures)

Reduction formulae, applications of definite integrals to evaluate surface areas and volumes of solids of revolution, idea of improper integrals, Beta and Gamma functions and their properties.

MODULE 2: Calculus (8 lectures)

Successive differentiation, standard forms, Leibnitz's theorem (without proof), Taylor's and Maclaurin's theorem with remainders, indeterminate forms and L' Hospital's rule, Curvature and Radius of curvature (both in Cartesian and Polar co-ordinates).

MODULE 3: Sequences and series (6 lectures)

Idea of convergence of sequence and series, Fourier series, Half range sine and cosine series, Parseval's theorem.

MODULE 4: Multivariable Calculus (8 lectures)

Partial derivatives, Euler's theorem, Total derivatives, Maxima, Minima and saddle points, Method of Lagrange multipliers, Double and Triple Integrals and its applications to find areas and volumes.

MODULE 5: Linear Algebra (10 lectures)

Inverse and rank of a Matrix, Linear independence of vectors, rank-nullity theorem, system of linear equations, Symmetric, skew-symmetric and orthogonal matrices, Eigen values and eigen vectors, Diagonalization of matrices, Cayley-Hamilton theorem (without proof), Orthogonal Transformation.

Suggested Text/ Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Course Outcome: After successful completion of the course, the students will be able to:

CO1: apply the techniques of differential and integral calculus to solve simple Engineering problems.
CO2: Interpret the significance of Beta and Gamma functions.
CO3: apply Rolle's Theorem, power series and Fourier series to Engineering problems.
CO4: apply multi-functional variables, matrices and linear algebra as tools to solve Engineering problems.

Course Code	Course Title	Hours per week L-T-P	Credit C
CS181106	**Problem Solving Through Programming Using C**	**2-0-2**	**3**

MODULE 1: Introduction to Programming (3 Lectures)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, system software, application software, compilers, interpreter etc.

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples.

From algorithms to programs; source code, compilation, object and executable code, Syntax and Logical Errors in compilation, storage of data inside program using variables, data types, modular programming, structure of a C program.

MODULE 2: Expressions and precedence (2 Lectures)

Writing C expressions using operators (arithmetic, relational, logical, dereferencing, arrow operator, period operator, conditional operator, subscript operator etc.), identifiers and literals, precedence of operators, evaluation of expressions using precedence and associatively rules.

MODULE 3: Conditional Branching and Loops (4 Lectures)

Writing and evaluation of conditionals and consequent branching using if..else and switch.. case statements, Iteration and loops using for loop, while loop and do..while loop.

MODULE 4: Arrays (2 Lectures)

Arrays (1-D, 2-D), Character arrays and C Strings.

MODULE 5: Basic Algorithms (4 Lectures)

Searching (sequential and binary), Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definitions for asymptotic analysis required).

MODULE 6: Function (3 Lectures)

User defined functions and built in libraries, function prototype, parameter passing in functions, call by value, passing arrays to functions: idea of call by reference (1-D and 2-D), scope rules for C language.

MODULE 7: Recursion (2 Lectures)

Recursion, as a different way of solving problems, example programs, such as Finding Factorial, Fibonacci series.

MODULE 8: Structure (2 Lectures)

Structures, defining structures, Accessing members, Array of Structures.

MODULE 9: Preprocessor Directives (1 Lecture)

#define, #include, #ifdef etc., conditional compilation.

MODULE 10: Pointers (4 Lectures)

Idea of pointers, defining pointers, pointer and arrays, pointer to structure, pointer to function, passing addresses of variables to functions (elementary and user defined), double indirection, Use of Pointers in self-referential structures, dynamic allocation/deallocation of memory blocks data types like elementary data types, arrays, structures, accessing elements of dynamically allocated memory, notion of linked list (no implementation).

Text Books:

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

(2) Yashavant Kanetkar, Let us C, BPB Publication

(3) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

(4) Yashavant Kanetkar, Understanding Pointers in C, BPB Publication

Reference Books:

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

Course Outcome (Theory)

Course Outcome	Statement
CO1	To design, represent and analyze algorithms for logical and numerical problems
CO2	To develop modular programs using functions and recursion
CO3	To create programs using static built-in and user defined data types for storage and processing of data
CO4	To develop programs for dynamic storage and processing of data
CO5	To develop solution for a computing problem through team work

Laboratory - Programming for Problem Solving

Total: 26 contact hours, 2 hours of lab/week

[to be evaluated for Continuous Evaluation (CE): 30 marks]

Lab1: Familiarization with programming environment (editors, compilation, debugging etc.) **(2 hours)**

Lab 2: Simple computational problems using expressions and precedence **(2 hours)**

Lab 3: Problems involving using if-then-else and switch statements (**2 hours)**

Lab 4: Iterative problems e.g., sum of series, factorial, Fibonacci series etc. **(2 hours)**

Lab 5: 1D, 2D Array manipulation: summation, finding odd/even in a set, string handling etc. **(4 hours)**

Lab 6: Matrix problems (addition, multiplication etc.), String operations (finding length, concatenation, comparing etc.)**(4 hours)**

Lab 7: Simple function illustrating the concepts, call by value **(2 hours)**

Lab 8: Recursive functions for summation, Fibonacci series, and factorial **(2 hours**)

Lab 9: Pointers, call by reference, passing arrays to functions, passing address of structure to function, passing array of structure to function, pointers and arrays, function pointer, dynamic allocation of block of memory and accessing the elements (**4 hours**)

Lab 10: File operations on text files, binary files (**2 hours)**

Course Outcome for Laboratory

Course Outcome	Statement
CO1	To translate a given algorithm to C program and become familiarized with programming environments
CO2	To build programs using modular programming and recursion
CO3	To build programs using built-in and user defined data types for data processing
CO4	To build programs for data processing using dynamic memory management
CO5	To solve a computational problem through team work
CO6	To exhibit self-learning by writing programs for solving problems in differentiation and integration by numerical methods

Course Code	Course Title	Hours per week L-T-P	Credit C
EE181107	**Basic Electrical Engineering**	**3-0-0**	**3**

Objectives:

- To impart the basic knowledge of electric and magnetic circuits and to give idea of the AC fundamentals
- To impart the basic knowledge of working principles and applications of various electrical machines
- To impart the basic knowledge of working principles and applications of various measuring instruments
- To impart the basic knowledge of the electric house wiring and make the students aware of the electrical safety measures.

MODULE 1: DC Circuits (8 Lectures)

Definitions of active, passive, linear, nonlinear circuit elements and networks. Kirchoff's laws, nodal & mesh analysis, voltage & current sources, network theorems- superposition, Thevenin's, Norton's and maximum power transfer theorems.

MODULE 2: AC Circuits (12 Lectures)

Waveforms of alternating voltages and currents, instantaneous, average and RMS values, form factor & peak factor, forms of representation of alternating quantities, concept of phasor & phasor diagrams, Concept of lead & lag, reactances & impedances, AC circuits-resistive, inductive, capacitive, RL, RC & RLC series, parallel and series parallel combination, impedance triangle, admittance, active & reactive power & power factor.

Concepts of 3-phase AC, connections, phase & line values in star & delta connections, solutions of simple 3-phase balanced circuits with resistive & reactive loads, 3-phase power, and phase sequence

MODULE 3: Electrical Machines (12 Lectures)

Single Phase Transformers: Principle of operation, EMF equation, losses and efficiency, Basic idea of an auto-transformer.

DC machines: Electromechanical Energy Conversion, EMF and torque equations, Classification, characteristics and applications of various types of d.c. motors.

Induction Motors: Principle of operation of single phase and three phase induction motors, Application of Induction motors

MODULE 4: Instruments (4 Lectures)

Classification of instruments, essentials of indicating type instruments- deflecting torque, controlling torque, damping; types of indicating instruments, MC & MI type ammeters & voltmeters, extension of range- use of shunt & multipliers.

MODULE 5: Basics of Electrical Installations (4 Lectures)

Basic knowledge of domestic wiring, types of cables (names only), types of wiring; circuit layouts- single phase AC mains to DB; 3 phase connections; accessories- main switch, ceiling rose, fuse, MCB etc. Earthing- purpose & methods.

Text/Reference Books:

1. Basic Electrical Engineering--- Nagrath.
2. Basic Electrical Engineering---Mittle.
3. B.E.E. Science—Sahadev & Rana.
4. Electro-Technology—H. Cotton.
5. A text book of Electro-technology- B.L.Theraja.

Course Outcome: On successful completion of the course, the student will be able to:

CO1: Identify and analyze network theorems / a. c fundamentals and apply them to the solution of electrical engineering problems.

CO2: Gain basic idea of electrical quantities, such as current, voltage, power, energy, phase, frequency etc. and co-relate these concepts in various fields of electrical engineering.

CO3: Understand the principle of operation of different types of electrical machines.

CO4: Understand the basic principle of operation and use of different types of measuring instruments.

CO5: Get concrete idea about electrical installations and importance of the safety measures to be taken in this regard.

Course Code	Course Title	Hours per week L-T-P	Credit C
HS181108	**Communication and Professional Skill**	**1-0-2**	**2**

MODULE 1: Basic Communication (4 Lectures)

Concept and meaning of communication; Importance of communication, Objectives of communication, Process of communication, Characteristics of communication, Forms of communication, Barriers to communication, Communication Breakdown, Effective communication.

MODULE 2: Audience Analysis (3 Lectures)

Audience awareness, Audience analysis, Types of audience, Importance of audience analysis, Audience Profile, Analysing individual and group of audience, Adapting message to audience.

MODULE 3: Job Oriented Communication (5 Lectures)

Introduction to soft skills, Antiquity of soft skills, Classification of soft skills, Combating stage fright, Pre-presentation preparation, Guidance for effective delivery, Creating and designing of Power Point slides, Presentation Delivery, Organizational group discussion, Group discussion as part of selection process, Conferences, Symposia and Seminars, Job Interview, Objectives of interviews, Types of interview, Ground work before interview, Internship and Campus placement.

MODULE 4: Technical report writing (4 Lectures)

Concept of report writing, Importance of report, Characteristics of a report, Categories of report, Formats, Structure of a technical report, Planning, Drafting, Referencing and Styling

MODULE 5: Academic writing and Comprehension skills (3 Lectures)

Précis writing, Presenting Research paper and articles. Miscellaneous grammar.

MODULE 6: Job oriented writing skill (5 Lectures)

Official letters- Formats, Types and Language, Memo writing, Emails, Resume and Curriculum Vitae--the first step forward and Job application.

Reference Books:

1. Effective Technical Communication, M. Ashraf Rizvi. Tata McGraw Hill
2. Technical Communication: Principles and Practice, Meenakshi Raman and Sangeeta Sharma. OUP
3. Personality Development and Soft Skills, B.K.Mitra, OUP
4. Technical Communication for Engineers, S.Verma, VIKAS Publishing House Pvt. Ltd.

Course outcome:

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

CO1: Expand and develop basic understanding of the importance of communication.

CO2: Familiarise with different aspects of accurate and effective communication.

CO3: Demonstrate different writing skills i.e. technical, non-technical and other texts.

CO4: Prepare and present technical reports.

CO5: Acquire a basic knowledge of various. job oriented communication skills.

LANGUAGE LABORATORY:

[to be evaluated for Continuous Evaluation (CE): 30 marks]

Objectives of the Practical Course:

1. Practical classes in the Language Lab on sounds of English language, its word stress and intonation and on the silent letters in English words attempt to neutralize the learner's accent drawing their attention to the wrong pronunciation commonly made by the non-native speakers while interacting in English and facilitate them to do better in telephonic interviews conducted in English and have good intelligibility between them and the teachers when they go abroad for higher studies in the medium of English language.
2. Practical classes on Communicative English, Essential English Grammar, Building Vocabulary, Common Errors in English and Reading and Listening exercises attempt to introduce the learners to speech mannerism both formal and informal, strengthen their grammatical knowledge of English, enrich their word stock, make them aware of common mistakes made by non- native speakers while interacting in English and develop their reading, comprehension and listening skills.
3. Interactive sessions in the lab such as Presentation, Group Discussion, JAM, Role Playing and Describe People/Object/Place work as ice-breaking activities, participation in which enables the students to overcome their inhibitions while speaking; invigorate their presence of mind; enhance their critical focus; boost their confidence level; develop their team spirit, leadership quality and problem solving ability; hone their presentation skill and assist them to have effective communication in English (both verbal and non verbal) and be skilled in time management.
4. Writing home assignments with the aid of given guidelines gives the students the scope to enhance their writing skills in English and become aware of various societal issues and problems.
5. The Practical Course aims to develop the communicative skills of the students in English and make a growth of different facets of their personalities to enable them to fare better and have dynamic sustenance in today's academic, social and professional lives.

Syllabus:

Unit – I

Computer/ software aided lessons for practical classes: **Contact Hours: 28**

- Pronunciation: Vowels, Diphthongs and Consonants sounds, Stress and Intonation and Silent Letters in English words.
- Communicative English - Exercises on situational dialogues/ role play in both formal and informal contexts.
- Essential English Grammar
- Building Vocabulary – synonyms, antonyms and phrases and idioms
- Common Errors in English
- Developing reading, comprehension and listening skills with the aid of language lab devices of reading and listening exercises.

Unit – II

Activities/ Interactive sessions for practical:

- Paper Presentation (Manuscript/ Power Point) **Contact Hours: 20**
- Group Discussion
- Just a Minute' Session (JAM)
- Role Playing
- Describing Object/People/Place.

Unit – III

Home Assignments:

- Each student has to submit two home assignments following the guidelines given with a view to enhance their writing skills as well as make them aware of various ethical and environmental issues, social problems, current affairs etc. on the topics of which the writings are to be submitted.

Books recommended in addition to the software installed in the systems with the objective to add to the students' knowledge of the different units of the syllabus and to aid them in interactive sessions:

- Marks, Jonathan. *English Pronunciation in Use: Elementary.* Cambridge: CUP, 2009.
- Hewings, M. *English Pronunciation in Use. Advanced.* Cambridge: CUP, 2009.
- Rottanji. *A Book on Silent Letters in English*. Web
- *English Language Communication Skills (ELCS) Lab Manual- cum-Work Book.* New Delhi: Cengage Learning India Pvt., 2013.
- Murphy, Raymond. *Essential English Grammar: A Self Study Reference and Practice Book for Elementary Students of English 2nd edition*. Cambridge: CUP.

- Hewings, Martin. *Advanced English Grammar: A Self Study Reference and Practice Book for Advanced South Asian Students*. Cambridge: CUP.
- Merriam-Webster. *The Merriam-Webster Dictionary of Synonyms and Antonyms*. US: Merriam-Webster.1984.
- Gulland, Daphne M and David G. Hinds- Howell. *Dictionary of English Idioms 2nd Revised Edition*. UK: Penguin. 2001.
- Kumar, Sanjay and Pushp Lata. *Communication Skills, Second* Edition. OUP. 2015.
- Chin, Peter, Samuel Reid et al. *Academic Writing Skills Student's Book 2*. Cambridge: CUP.
- Cholji, Mark. Towards Academic English: Developing Effective Writing Skills. Cambridge: CUP.
- *Spoken English* (CIEFL) in 3 volumes with 6 cassettes, OUP.

Course Code	Course Title	Hours per week L-T-P	Credit C
CY181111	**Chemistry-101 Lab**	**0-0-2**	**1**

List of Experiments:

Choice of 6 experiments from the following:

1. Determination of surface tension of a given liquid at room temperature by Stalagmometer.
2. Determination Co-efficient of viscosity of a given liquid at room temperature by Ostwald's Viscometer.
3. Measurement of conductivity of an Electrolyte.
4. Determination of pH of strong and weak acid & bases by using pH meter.
5. Determination of available chlorine in bleaching powder.
6. Determination of total hardness of water by EDTA method.
7. Estimation of percentage of copper in brass sample.
8. Estimation of iron.
9. Salt analysis.
10. Separation of components of a mixture by paper chromatography.

Reference books

1. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R.C. Denny, G.H.Jeffery, 4th Ed.
2. Practical Engineering chemistry by Sunitha and Rathna.

Course Outcome

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

CO1 to measure molecular/system properties such as surface tension, co-efficient of viscosity, conductivity of electrolyte, pH of acid and bases, available chlorine content in bleaching powder, hardness of water, copper content in brass, estimation of iron etc.

CO2 to get expose for analysis of basic radicals qualitatively in given salt mixture

CO3 to expose the students to the students to the paper chromatography technique for detection of components from a mixture of components.

Course Code	Course Title	Hours per week L-T-P	Credit C
EE181117	**Basic Electrical Engineering Lab**	**0-0-2**	**1**

List of Laboratory Experiments/Demonstrations:

1. Basic safety precautions, Introduction and use of measuring instruments.
2. Calibration of measuring instruments.
3. Verification of Thevenin's Theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Measurement of power in a single phase AC circuit using Wattmeter.
6. Measurement of circuit parameters under steady-state condition for RLC circuits.
7. Demonstration of cut-out sections of Electrical Machines.
8. Characteristics of incandescent lamp.
9. Study of balanced three phase circuits.
10. Demonstration of layout of house wiring.
11. Demonstration of measurement of insulation resistance.

Text / References:

1. D. P. Kothari and I. J. Nagrath, ―Basic Electrical Engineering‖, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, ―Basic Electrical Engineering‖, McGraw Hill, 2009.
3. L. S. Bobrow, ―Fundamentals of Electrical Engineering‖, Oxford University Press, 2011.
4. E. Hughes, ―Electrical and Electronics Technology‖, Pearson, 2010.
5. V. D. Toro, ―Electrical Engineering Fundamentals‖, Prentice Hall India, 1989.
6. B. L. Theraja, A. K. Theraja, ―A Text Book of Electrical Technology Vol I, II, IV‖, S. Chand & Co., 2015.
7. Abhijit Chakrabarti, Sudipta Nath and Chandan Kumar Chanda, ―Basic Electrical Engineering‖, Tata McGraw-Hill, 2017

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

CO1: be familiar with switching on and taking precautionary measures while handling electrical equipment.

CO2: apply knowledge of different types of electrical circuits, components and instruments to relate theoretical concepts with experimentation.

CO3: organize and write an engineering report including graphs and tables after performing an experiment.

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