SEMESTER 1

23-200-0101B CALCULUS

Course Outcomes:

On completion of this course the student will be able to:

1. *Solve ordinary differential equations and linear differential equations of higher orders with constant coefficient and apply them in engineering problems*
2. *Determine the maxima and minima of multivariable functions.*
3. *Convert line integrals into surface integrals and surface integrals into volume integrals*
4. *Illustrate the physical meaning and application of gradient, divergence and curl.*

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2									
CO2	3	2	2									
CO3	3	2										
CO4	3	3	2									

1-Slightly; 2-Moderately;3-Substantially

Module I

Ordinary differential equations:

First order differential equations - exact differential equations, Bernoulli's equations--Methods of solution and Simple applications.

Linear differential equations of higher orders with constant co-efficient- Methods of solution of these equations. Cauchy's linear differential equations. Simultaneous linear differential equations- Simple applications of linear differential equations in engineering problems –Electrical Circuits, Mechanical Systems**.**

Module II

Partial differentiation: Partial differentiation-Concept of partial derivative - Chain rule- Total derivative- Euler's theorem for homogeneous functions, Differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables (Proof of the result not required)-Simple applications.

Co-ordinate systems: Rectangular co-ordinates-Polar co-ordinates-In plane and in Space-Cylindrical polar co-ordinates-Spherical polar co-ordinates.

Module III

Integral calculus:

Application of definite integrals: Area, Volume, Arc length, Surface area.

Multiple integral: Evaluation of double integrals-Change of order of integration. Evaluation of triple integrals- Change of Variables in integrals.

Applications of multiple integrals. Plane Area, Surface area & Volumes of solids

Module IV

Vector calculus: scalar and vector point functions, gradient and directional derivative of a scalar point function, divergence and curl of vector point functions, their physical meaning. Evaluation of line integral, surface integral, and volume integrals, Gauss's divergence theorem, Stoke's theorem (No proofs), conservative force fields, scalar potential.

References:

1. Sastry S.S. Engineering Mathematics: Vol1 (Fourth edition). PHI Learning, New Delhi. (2008).
2. Erwin Kreyzig, Advanced Engineering Mathematics (Tenth edition). John Wiley & Sons, Hoboken, NJ.(2011)
3. Veerarajan T. Engineering Mathematics. (Third edition). Tata McGraw-Hill Publishers, New Delhi. (2011)
4. Grewal B.S .Higher Engineering Mathematics.(Forty third Edition). Khanna Publishers, New Delhi (2013).

23-200-0102B ENGINEERING PHYSICS

Course Outcomes:

On completion of this course the student will be able to:

1. *Interpret modern devices and technologies based on lasers and optical fibers.*
2. *Explain the basic principles of crystal physics*
3. *Summarize the characteristics and applications superconducting materials nanomaterials and smart materials*
4. *Illustrate the theory of semiconductors and magnetic materials*
5. *Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations.*

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2									
CO2	3	1	1									
CO3	3	2	1									
CO4	2	2	2									
CO5	3	2	2									

1-Slightly;2-Moderately;3-Substantially

Module I

Laser- properties- interaction of radiation with matter- absorption, spontaneous and stimulated emission- principle of laser- Einstein coefficients- population inversion- metastable state -Basic components of a laser- construction and working of Ruby laser and He-Ne laser -Applications.

Fiber optics - Basic structure - principle- step index fiber and graded index fiber- single mode and multimode- Numerical aperture (no derivation) -acceptance angle and acceptance cone- propagation- Applications.

Module II

Crystallography – Space lattice- Basis- Unit cell- Bravais lattices- cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Coordination number- Atomic radius-Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-

Xrays- Production, Properties, characteristic and continuous X-rays, Moseley's law; Diffraction of X-rays- Bragg's law (derivation), Bragg's Spectrometer

Module III

Superconductor-transition temperature- Meissner effect-effect of current- isotope effect- Type 1 and type 2 superconductors –BCS theory (basic idea only)- Applications.

Nanomaterials- nanoparticle, nano ring, nano rod, nanoshells, fullerene- surface occupancy- quantum confinement effect- optical, electrical, magnetic and mechanical properties - Applications.

Smart materials-Liquid crystals, Metallic glasses, Shape memory alloys- optical, electrical magnetic and mechanical properties-applications.

Module IV

Magnetic Materials- Magnetic pole strength, magnetic moment, intensity of magnetization, magnetic field, magnetic induction, magnetic susceptibility, magnetic permeability, classification. Hard and soft- Paramagnetic materials-properties, Diamagnetic materials-properties, Ferromagnetic properties- Antiferromagnetic materials, Ferrimagnetic materials- Applications

Semiconductor- Properties- Energy band description- effect of temperature- intrinsic, extrinsic semiconductors- n-type and p-type semiconductors-Majority and minority carriers.

Laboratory Experiments to be conducted in the virtual lab mode

List of Experiments (Minimum six experiments shall be conducted)

1. Transmission grating: To find the wavelength of laser beam
2. Determination of NA of an optical fiber
3. Laser beam divergence and spot size
4. Determination of Grain size and lattice parameter using Bragg's X-ray spectrum
5. Lattice planes from X Y Z intercepts
6. LCR circuits to find the resonance frequency and quality factor.
7. Diode characteristics
8. Ohm's law
9. LED circuits to find cutting voltage.
10. Determination of Energy band gap of a given semiconductor material
11. Magnetic field along the axis of a circular coil carrying current
12. Deflection Magnetometer

References:

1. S. Mani Naidu, A Textbook of Engineering Physics, Pearson. (2010)
2. A.S. Vasudeva, Modern Engineering Physics, S. Chand & Co. (2013)
3. Prabir K. Vasu and Hrishikesh Dhasmana, Engineering Physics, Ane books Pvt. Ltd. (2010)
4. S.O. Pillai and Sivakami, Applied Physics, New Age International (P) Ltd., Second Edition. (2008)
5. G.S. Raghuvanshi, Engineering Physics, Prentice Hall of India. (2008)

Pattern of Continuous Assessment

Test – I for the theory portions: 15 marks Test -II for the theory portions: 15 marks

Assignment from the theory portions: 5 marks

Laboratory record and Viva-voce: 10 marks (5 + 5)

Attendance: 5 marks

The students are required to submit the laboratory record.

23-200-0103B INTRODUCTION TO ELECTRONICS DEVICES & CIRCUITS

Course Outcomes:

On completion of this course the student will be able to:

1. *To understand the working principle of various semiconductor devices*
2. *To apply the acquired knowledge to the use of semiconductor devices in various applications.*
3. *To design simple electronic circuits for a given application.*

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2									1
CO2	2	2	2									1
CO3	1	3	1	1								1

1-Slightly;2-Moderately;3-Substantially

Module I:

Semiconductor basics. PN junction diode and its characteristics, Diode Models Diode Applications: Rectifiers- Half wave and full wave rectifiers, Capacitive Filter Clipping and clamping circuits, Special purpose diode: Zener Diode, LED, Photo diode; Zener Shunt, Transistor series regulator

Module II:

Bipolar Junction Transistors (BJT): Transistor Structure, Transistor operation, Transistor characteristics (CE & CB only) and alpha & beta Parameters , r parameter model, h parameter Transistor as an amplifier, Transistor bias circuits: DC operating point, load line, stabilization, Voltage divider bias, Thermal runaway. Transistor switch. FET, FET characteristics

Module III:

Amplifiers: classification of amplifiers as Voltage, Current, transconductance & transresistance amplifiers-properties, operation, CB, CC & CE Amplifiers, bypass and coupling capacitor, common emitter Amplifier, Amplifier Frequency Response: Basic concepts, Low frequency and High frequency response cutoff Total Amplifier frequency Response. FET amplifier (CS configuration only), Multistage amplifier (qualitative study).

Module IV:

Feedback in amplifier, benefits of feedback, positive & negative feedback (qualitative study). Oscillator: RC phase shift oscillator, circuit & its working. LC oscillator Multivibrator: astable multi vibrator, circuit & it's working. Bistable multi vibrators, circuit & its working. Bistable as memory.

References:

1. David M. Buchla, Thomas L. Floyd, Electronics Pearson Education Limited, Year: 2014
2. K V Ramanan, Functional Electronics, Tata McGraw-Hill Publishing Company Ltd. (1984).
3. Donald Neamen, Semiconductor Physics and Devices, Tata McGraw-Hill Publishing Company Ltd., 4th edition (2021).
4. Jacob Milman & Christos C Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, McGraw Hill Education, 2 nd edition (2017).

23-200-0104B INTRODUCTION TO ELECTRICAL ENGINEERING

Course Outcomes

On completion of this course the student will be able to:

1. *Apply elementary principles for finding the DC response of Circuits.*
2. *Develop & solve models of basic magnetic & electromagnetic circuits.*
3. *Apply elementary principles for finding the sinusoidal steady state features of Circuits.*
4. *Familiarize with the basic engineering principles of some common electrical systems.*

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2									1
CO2	2	2	2									1
CO3	1	3	1	1		1						1
CO4	2	1	1			2						1

1-Slightly; 2-Moderately; 3-Substantially

Module I:

Elementary Concepts of Electric Circuits Elementary concepts of DC electric circuits: Basic Terminology including voltage, current, power, resistance, emf; concept of linear, non linear, unilateral, bilateral, active& passive circuit elements, independent voltage & current sources, Interconnection of Resistances- series, parallel, series-parallel, star & deltainter connection, Star-delta/ delta-star transformation; Current and Voltage Division Rules; Capacitance: Parallel plate capacitance with single dielectric, V-I relations and energy stored, Capacitance sin series, parallel & series- parallel; Ohm’s Law and Kirchhoff's laws- Problems.

Introduction to Dynamic Circuits: DC Sourced & Source free Response of RC series circuit, Time Constant, Concept of transient & steady state components of response.

Module II:

Elementary Concepts of Magnetic & Electromagnetic Circuits and AC fundamentals

Magnetic Circuits: MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits-Series and parallel magnetic circuits with composite materials, numerical problems.

Electromagnetic Induction: Faraday's laws, Lenz's law- statically induced and dynamically induced emfs, conductor moving in a uniform magnetic field, Self-inductance and mutual inductance, coefficient of coupling, V-I relations of self & mutual inductance, Two winding Transformer, Basic Transformer Equation connecting voltages, currents & number of turns, energy stored in a coupled coil system, Series Connection of coupled Inductances.

Alternating Current fundamentals: Representation of sinusoidal waveforms: frequency, period, cycle, phase, Average, RMS values and form factor of waveforms-Numerical Problems.

Module III:
Sinusoidal Steady State Response:
Sinusoidal Steady Response of Basic Elements: Phasor Representation of sinusoidal quantities, Trigonometric, Rectangular, Polar and complex forms, Response of basic R, L and C elements to a sinusoidal voltage or current–Phasor diagrams, Average power and power factor-Numerical Problems.

Series and Parallel AC Circuits: Reactances, Impedance, Admittance, Solution of series, parallel & series-parallel AC circuits, Power in AC circuits: active, reactive & apparent powers-Numerical Problems, Resonance in series and parallel circuits, Frequency dependence of impedance and admittance, frequency & frequency response plots, half power/cut off frequency, bandwidth

Three phase AC systems: Star and delta connected balanced three phase systems, Phasor diagram, relation between line and phase voltages, line and phase currents, active, reactive & apparent powers-Numerical problems

Module IV: Applications

Dynamic Circuits: Use of simple first & second order resonant/non resonant RLC circuits as low pass, high pass, band pass & band stop filters, RC Differentiator & Integrator

Power Circuits of domestic/Daily Use Appliances: Concept of Linear & non linear AC loads, very basic concept of Power Quality, Functional Block Diagram of the power circuit of modern domestic/daily use appliances-LED Lamps & Tubes, BLDC Fans, Mobile & Laptop Chargers, Inverter Air Conditioner & Inverter Refrigerator, Need & methods of galvanic isolation.

Rechargeable Batteries: Basic Terminology, Battery Capacity, SOC, SOE, SOH DOD, C-rate, Cycle Life, Cut off voltage, deep cycle, Charging Profile, self discharge, Energy Density, Power density, Specific Energy, Specific Power, Purpose & Functions of BMS.

UPS: Functional block diagram, Specifications and Applications of online & offline UPS, computation of back up time.

Power Systems: Various levels of Power Transmission/Distribution- Typical Single line diagram

References

1. Edward Hughes. Electrical technology. Pearson Education 8th ed. 2002.
2. Robert L. Boylestad. Introductory circuit analysis. Pearson Education, 14th edition 2022
3. Cotton, H. Electrical technology. CBS Publishers and Distributors, New Delhi. 7th edition
4. Leonard S. Bobrow. Fundamentals of electrical engineering. Oxford University Press. second edition, 1996

23-200-0105B COMPUTER PROGRAMMING

Course Outcomes:

On completion of this course the student will be able to:

1. *Identify main components of a computer system and explain its working.*
2. *Develop flowchart and algorithms for computational problems.*
3. *Write the syntax of various constructs of C language.*
4. *Build efficient programs by choosing appropriate decision-making statements, loops and data structures.*
5. *Design modular programs using functions for larger problems.*

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											1
CO2	2	2	3		2							1
CO3	3											1
CO4	3	3	3		3							2
CO5	3	3	3		2	2						2

1-Slightly;2-Moderately;3-Substantially

Module I

Basics of Computer and Information Technology: Digital Computer System (CPU, Memory, I/O devices) - Working of a digital computer-Hardware and Software: Definition - Categories of Software, Application of Computers.

Problem Solving Methodology: Problem statement, Analysis, Design a solution, Implement/Coding the solution, Test the solution, Design tools (Algorithm, Flow-chart, Pseudo-code)- Develop algorithms for simple problems.

Programming Languages: Types of Languages- Compiler– Interpreter- Linker– Loader– Execution of program.

Module II

Basics of C: Character set-Identifier- Keywords- Constants –Data Types- Variables and declaration –Operators and Expressions – Operator precedence and associativity – Expression Evaluation (Simple Examples) – Input and output functions – Simple computational problems involving the above constructs.

Control Statements: Selection, Conditional operator, Iteration (for, while, do-while), Branching (switch, break, continue, go to), Nesting of control statements- Problems using control statements.

Module III

Arrays: One-dimensional array: Declaration, Initializing and Accessing of Array, Operations with Array, Internal Representation of Array, Working with One-dimensional Array(searching and sorting).

Multi-dimensional array: Declaration, Initializing and Accessing of Array, Working with Two-dimensional Arrays with Matrix.

Strings: Declaration, Initialization and Accessing of String, String Functions, Working with One-dimensional character Array and String Functions.

Functions: Concept of Function, Using Function (Declaration, Definition and Calling), Parameter Passing in C, Inline Function, Recursion, Working with Functions.

Module IV

User defined data types: Structure, Union & Enumerated data type- Declaration, Initialization and Accessing of Structure, Union & Enumerated Data types, Structure versus Union, Arrays of Structure, Working with Structures.

Pointers: Declaration, Initialization & Accessing Pointer– Use of Pointers, Pointer Arithmetic, Arrays and Pointers, Structures and Pointers, Working with Pointers (Pointers to Array: One-dimensional arrays and pointers, Passing an array to a function), Dynamic memory allocation. Command line arguments.

References:

1. Pradip Dey and Manas Ghosh, Computer Fundamentals and Programming, Second Edition, Oxford University Press, (2013).
2. Byron Gottfried, Programming with C, Fourth edition, Tata McGraw-Hill, (2018).
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Second Edition, Pearson Education, (2015).
4. R.G. Dromey, How to solve it by Computer, Pearson Education, (2008).
5. Kanetkar Y, Let Us C: Authentic guide to C programming language (18th Edition), BPB Publications, (2021).

23-200-0106B SOFT SKILLS DEVELOPMENT

Course Outcomes:

On completion of this course the student will be able to:

1. *Use English language at the formal and informal levels for daily conversations, presentations, group discussions and debates.*
2. *Demonstrate the ability to read, comprehend and answer questions based on literary, scientific and technological texts.*
3. *Develop self-motivation, raised aspiration, belief in one's own abilities and commitment to achieving one's goal.*
4. *Demonstrate emotional maturity and emotional health.*

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1		2	2	3		
CO2						2		2	2	3		
CO3						1		2	2	2		
CO4						1		2	2	2		

1-Slightly; 2-Moderately; 3-Substantially

Module I

Role and importance of verbal communication – Everyday active vocabulary, common words used in transitions, enhancing vocabulary, affixes and changes in pronunciation and grammatical functions, words often confused in pronunciation and usage. Passage comprehension: skimming, scanning techniques, note making, note taking and summarizing. Deciphering meaning from contexts. Types of meaning: literal and contextual. Constructive criticism of speeches and explanations.

Module II

Fundamental grammar – Simple structures, passivizing the active sentences, reported speech, the judicious use of tenses and moods of verbs, forming questions and conversion from questions to statements and vice versa, forming open-ended and close- ended questions. Words and style used for formal and informal communication. Practice converting informal language to formal, the diction and the style of writing. Dealing with the nuances of ambiguous constructions in language. Learning authoritative writing skills, polite writing and good netiquette. Writing for internships and scholarships. Co-ordinate systems: rectangular co-ordinates, polar co-ordinates – in plane and in space, cylindrical polar co-ordinates, spherical polar co-ordinates.

Module III

Communication – Kinesics, proxemics, haptics, and other areas of non-verbal communication, fighting communication barriers, positive grooming and activities on the same. Different types of interviews and presentation: oral, poster, ppt. organizing ideas for group discussions, the difference between GD and debates. Effective listening and seeking to understand others perspectives. Non-violent negotiation and persuasion, communicating across age groups, cultures

or identity groups. Higher order thinking and evaluation, information seeking, research, and independent learning, synthesis, creativity, problem analysis and problem solving. Decision making, self- reflection and learning from experience.

Module IV

Developing positive self – Understanding oneself, realistic awareness of oneself and one's abilities, strengths and potential, self-esteem, self-efficacy, steps for improvement. Intra-personal skills: self-control, emotional regulation and self-discipline, conscientiousness, dutifulness, reliability, truthfulness, honesty and trustworthiness. Goal orientation and initiative. Time management – characterisation work. Interpersonal skills: cross cultural competence and valuing diversity of perspectives, respecting and expressing concern for others. Empathy and ability to notice the effect of one's actions on others, tolerance for disagreement, conflict management and resolution.

References:

1. Duck, Steve and David T. Macmahan. Communication in Everyday Life. 3rd Ed. Sage, (2017).
2. Gamble, Kawl Teri and Michael W. Gamble. The Public Speaking Playbook. Sage, (2017).
3. Meenakshi Raman, and Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, (2015).
4. Daniel Goleman, Emotional intelligence: Why it can matter more than IQ, Random House (2012).
5. Devadas Menon. Stop sleepwalking through life, Yogi Impressions Books Pvt. Ltd, Mumbai (2013).
6. Barun K Mitra. Personality Development and Soft Skills, Oxford University Press (2012).

ASSESSMENT

- 'Soft Skills Development' is a practical and activity-oriented course which has continuous assessment for 50 marks based on classroom interaction, activities, and assignments. The activities may include 'Just a Minute' (JAM) sessions, group discussion, role play, debate, and extempore speech.
- The weightages for the different components shall be as follows:
    - Classroom interaction – 10 marks Activities – 30 marks
    - Assignments (from Modules I and II) – 10 marks
    - Semester End Examination is not envisaged.
- A student should secure a minimum of 50% marks in continuous assessment for a pass in the course.

23-200-0107B COMPUTER PROGRAMMING LABORATORY

Course Outcomes:

On completion of this course the student will be able to:

1. *Write programs using loops and decision making statements in C language.*
2. *Implement different operations on arrays.*
3. *Solve problems using functions and recursion.*
4. *Design and implement C programs using the concepts of structure and pointers.*

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3		2							1
CO2	3	2	1									1
CO3	3	3	3		3	1						2
CO4	3	3	3		2	1						2

1-Slightly; 2-Moderately; 3-Substantially

Cycle I

Application Packages:

Text Editor

1. To create a word document like an advertisement.

Spreadsheet

2. To create a spreadsheet to analyze the marks of the students of a class and also to create appropriate charts.

Presentation Software

3. To create a presentation for the department using MS PowerPoint.

C Programming Basics:

4. To write a program to calculate and display areas of rectangle and triangle.

Decision Making:

6. To write a program for electricity bill preparation.
7. To write a program to find the roots of a quadratic equation.
8. To write a simple menu driven calculator program using switch statements.
9. To write a program to find the sum of digits of a given number.

Cycle II

Looping:

10. To write a program to print all the prime numbers of a given range.
11. To write a program to print the sine and cosine series.
12. To write a program to print Pascal's triangle.

Arrays:

13. To write a program to print the sum and average of elements in an array.
14. To write a program to sort the given numbers using bubble sort.
15. To write a program to perform Matrix addition and matrix multiplication.

String:

16. To write a program to perform string manipulation functions like string concatenations, comparison, find the length and string copy without using library functions.
17. To write a program to arrange names in alphabetical order.

Cycle III

Functions:

18. To write a C program to calculate the mean, variance and standard deviation using functions.
19. To write a C program to perform sequential and binary search using functions.

Recursion:

20. To write a program to print the Fibonacci series using a recursive function.
21. To write a program to print the factorial of the given number using a recursive function.

Structure:

22. To print the mark sheet of N students using structures.

Pointers:

23. To write a program using pointers to access the elements of an array and count the number of occurrences of the given number in the array.

References:

1. Pradip Dey and Manas Ghosh, Computer Fundamentals and Programming in C, Second Edition, Oxford University Press, (2013).
2. Smarajit Ghosh, All of C, PHI Learning Pvt. Ltd, (2009).
3. Byron Gottfried, Programming with C, Fourth edition, Tata McGraw-Hill, (2018).
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Second Edition, Pearson Education, (2015).
5. Sukhendu Dey, Debobrata Dutta, Complete Knowledge in C, Narosa PublishingHouse, New Delhi, (2013).
6. R.G. Dromey, How to solve it by Computer, Pearson Education, (2008).
7. Kanetkar Y, Let Us C: Authentic guide to C programming language (18th Edition), BPB Publications, (2021).

23-200-0108B ELECTRICAL ENGINEERING LAB

Course Outcomes

On completion of this course the student will be able to:

1. *Identify & choose appropriate apparatus for ON-OFF Control, protection diagnosis & instrumentation of a typical LV electrical appliance/circuit.*
2. *Familiarize with various types of electric motors and conventional & smart electrical systems.*
3. *Familiarize with the electrical characteristics of common appliances & solar panels.*

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2									1
CO2	2	2	3									
CO3	1	3	2	2					1			

Details of Experiments

1. Familiarization with various electrical apparatus like switches, relays, smart plugs, smart switches, conventional to smart switch converters, AC & DC Voltmeter, AC & DC Ammeter, Multimeter, Wattmeter, Energy meter, fuse, MCB, Isolator, RCB, ELCB, RCBO
2. Verification of Ohm's Law & Kirchoff's Laws for both DC & AC circuits.
3. Domestic Wiring Circuits with one way/two way switches & plug point.
4. Experimental determination of V-I characteristics, MPP & predetermination of operating point of a solar panel for resistive load.
5. Measurement of Current, Power, Power Factor & Energy of :
   a. A single phase circuit with known parameters
   b. Various domestic/daily use appliances like LED Lamps, LED Tubes, Ceiling fans, Laptop, LED Display, PC+LED Display.
6. Experimental/Simulation based study of an RLC series Circuit under resonant & non resonant conditions.
7. Experimental determination of frequency Response of Circuits.
8. Familiarization with various types of Electrical Machines
9. Experiment on Automatic Street Lighting System.
10. Experiments on Home Automation.

23-200-0109B LANGUAGE LABORATORY

Course Outcomes:

On completion of this course the student will be able to:

1. *Test pronunciation skills through stress on word accent, intonation, and rhythm.*
2. *Use the English language effectively for writing business letters, resumes, minutes of meetings and reports.*
3. *Use the English language effectively to face interviews, group discussions, and public speaking*

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									2	3		2
CO2									2	3		2
CO3									2	3		2

1-Slightly; 2-Moderately; 3-Substantially

The following exercises are prescribed for the **Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Preparing business letters
4. Preparing a resume
5. Conducting a meeting and writing the minutes
6. Writing a report
7. Situational Dialogues / Role Play.
8. Oral Presentations- Prepared and Extempore.
9. 'Just A Minute' Sessions (JAM).
10. Describing Objects / Situations / People.
11. Debate
12. Group discussion