GLOBAL INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
COURSE CATALOGUE
REGULATIONS B.TECH – GR - 24
COMPUTER SCIENCE AND ENGINEERING
II SEMESTER

Course Code	Course Name	Subject Area	Category	Periods Per Week			Credits	Scheme of Examination Max Marks		
				L	T	P		CIA	SEE	Total
INDUCTION PROGRAM										
THEORY, Basic Electrical and Electronics Engineering Lab, Python Programming Lab										
MA201BS	Differential Equations and Vector Calculus	BSC	Foundation	3	1	0	4	40	60	100
PH202BS	Applied Physics	BSC	Foundation	3	1	0	4	40	60	100
EC203BS	Basic Electrical and Electronics Engineering	ESC	Foundation	2	1	0	3	40	60	100
CS204ES	Data Structures	ESC	Foundation	3	0	0	3	40	60	100
PRACTICAL										
CS205ES	Python Programming Lab	BSC	Foundation	0	0	2	1	40	60	100
PH206BS	Applied Physics Lab	ESC	Foundation	0	0	2	1	40	60	100
EC207ES	Basic Electrical and Electronics Engineering Lab	ESC	Foundation	0	0	2	1	40	60	100
CS208ES	Data Structures Lab	ESC	Foundation	0	1	3	2	40	60	100
ME209ES	Engineering Workshop	ESC	Foundation	0	0	2	1	40	60	100
MANDATORY COURSE										
*MC210	Constitution of India	MC	MC - II	Ref: Academic Regulations B.Tech GR 24						
			Total Credits	**20**						

COURSE CONTENT

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS								
II Semester: Common to All Branches								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
MA201BS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**1**	**-**	**4**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 64**		
Prerequisite: Mathematical Knowledge at the pre-university level								

1. COURSE OVERVIEW

This course serves as a foundation course on differential equations and vector calculus. It includes techniques for solving ordinary differential equations, partial differential equations, vector differentiation and vector integration. It is designed to extract the mathematical developments, and skills, from basic concepts to advanced level of engineering problems to meet technological challenges.

2. COURSE OBJECTIVE

The students will try to Learn:

1. Methods of solving the differential equations of first and higher order.
2. Concept, properties of Laplace transforms
3. Solving ordinary differential equations using Laplace transform techniques
4. The physical quantities involved in the engineering field related to vector-valued functions
5. The basic properties of vector-valued functions and their applications to line, surface and volume integrals

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Identify whether the given differential equation of first order is exact or not
CO 2	Solve higher differential equations and apply the concept of differential equations to real-world problems.
CO 3	Use the Laplace transforms techniques to solve ODEs.
CO 4	To find Gradient, Divergence, Curl and Vector identities
CO 5	Evaluate the line, surface and volume integrals and convert them from one to another

4. COURSE CONTENT

UNIT - I: First Order ODE **8 L**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, and Orthogonal Trajectories (Cartesian & Polar) Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT - II: Ordinary Differential Equations of Higher Order **10 L**

Second-order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sinax , cosax, 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. Applications: Electric Circuits.

UNIT - III: Laplace Transforms **10 L**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Change of Scale Property, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: Solving initial value problems by the Laplace Transform method.

UNIT - IV: Vector Differentiation **10 L**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration **10 L**

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

5. Text books

i. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
ii. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

6. Suggested Readings.

i. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
ii. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
iii. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications,
iv. Reprint, 2008.
v. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**										**2**	**3**	**2**
CO 2	**2**	**3**										**2**	**2**	**3**
CO 3	**2**	**3**											**2**	**3**
CO 4	**3**	**-**	**1**		**2**							**2**	**3**	**-**
CO 5	**3**	**3**			**1**							**2**	**3**	**3**

COURSE CONTENT

APPLIED PHYSICS								
I Semester: CE, ME, ECE, CSE(AI&ML), CSE(DS) **II Semester: CSE**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
PH202BS	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**1**	**-**	**4**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 64**		
Prerequisite: Basic principles of physics								

1. COURSE OVER VIEW

Applied Physics**,** is designed to explain the fundamental concepts and basic principles in the subject. A step-by-step build-up of the concepts makes this book student-friendly. The structure of each chapter redefines the parameters of conceptual learning through solved examples, theoretical questions, and objective questions. Conceptual arguments lead to the mathematical formulae providing a coherent mix of Physics and Mathematics.

2. COURSE OBJECTIVE

The students will try to Learn:

i. Understand the basic principles of quantum physics and band theory of solids.
ii. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
iii. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
iv. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
v. Study the characteristics of lasers and optical fibres.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 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.
CO 2	Identify the role of semiconductor devices in science and engineering Applications.
CO 3	Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
CO 4	Appreciate the features and applications of Nano materials.
CO 5	Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

4. COURSE CONTENT

UNIT - I

QUANTUM MECHANICS: Introduction to quantum physics, blackbody radiation – Stefan-Boltzmann's law, Wein's and Rayleigh-Jean's law, Planck's radiation law - photoelectric effect - 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: Symmetry in solids, free electron theory (Drude & Lorentz, Sommerfeld) - Fermi-Dirac distribution - Bloch's theorem -Kronig-Penney model – E-K diagram- effective mass of electron-origin of energy bands- classification of solids.

UNIT - II

SEMICONDUCTORS AND DEVICES: Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

UNIT - III

DIELECTRIC, MAGNETIC AND ENERGY MATERIALS: Dielectric Materials: Basic definitions-types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials – applications – liquid crystal displays (LCD) and crystal oscillators. Magnetic Materials: Hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance - applications - bubble memory devices, magnetic field sensors and multiferroics. Energy Materials: Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors - rechargeable ion batteries, solid fuel cells.

UNIT - IV

NANOTECHNOLOGY: 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) - characterization techniques - XRD, SEM &TEM - applications of nanomaterials.

UNIT - V

LASER AND FIBER OPTICS: Lasers: Laser beam characteristics-three quantum processes-Einstein coefficients and their relations lasing action - pumping methods- ruby laser, He-Ne laser, CO2 laser, Argon ion Laser, Nd: YAG laser, semiconductor laser-applications of laser. Fiber Optics: Introduction to optical fiber- advantages of **Optical Fibers:** - total internal reflection, construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers, losses in optical fiber - optical fiber for communication system - applications.

5. TEXT BOOKS

i. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.

ii. K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition,2022.

6. REFERENCE BOOKS

i. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.

ii. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition, 2018.

iii. A.K. Bhandhopadhya - Nano Materials, New Age International, 1st Edition, 2007.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**2**													**2**
CO 2	**1**		**3**				**2**							
CO 3	**1**				**3**									**2**
CO 4	**3**				**2**									
CO 5	**3**	**2**												

COURSE CONTENT

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING								
I Semester: CSE (AIML), CSE(DS) **II Semester: CSE**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC203BS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		2	**1**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 32	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVER VIEW:

This course enables knowledge on electrical quantities such as current, voltage, and power, energy to know the impact of technology in global and societal context. It provides the knowledge on basic DC and AC circuits used in electrical and electronic devices, highlights the importance of electrical machines and basics of semiconductor devices like diodes and transistors.

2. COURSE OBJECTIVE

The students will try to Learn:

i. The fundamentals of electrical circuits and analysis of circuits with DC and AC excitation using circuit laws.

ii. The construction and operation of Electrical machines.

iii. The operational characteristics of semiconductor devices with their applications.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Make use of basic electrical laws for solving DC and AC circuits.
CO 2	Apply network theorems for analysis of simple electrical circuits.
CO 3	Demonstrate the fundamentals of electromagnetism for the operation of DC and AC machines.
CO 4	Utilize the characteristics of semiconductor devices for the application of rectifiers and regulators.
CO 5	Interpret the transistor configurations for optimization of the operating point.
CO 6	Understand the amplifier circuits using transistors for calculating different parameters.

4. COURRSE CONTENT

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation.

A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits, Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-II:

Electrical Installations: Components of LT Switch-gear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB,

Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

UNIT-III:

Electrical Machines: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC generators, EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

UNIT-IV:

P-N Junction and Zener Diode: Principle of Operation Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Zener diode characteristics and applications.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L-section Filters, π- section Filters.

UNIT-V:

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.

Field Effect Transistor (FET): Construction, Principle of Operation, Comparison of BJT and FET, Biasing FET.

5. TEXT BOOKS

i. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University.
ii. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education.

6. REFERENCE BOOKS

i. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
ii. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
iii. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
iv. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
v. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
vi. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
vii. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
viii. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
ix. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

7. ELECTRONIC RESOURCES

- https://www.kuet.ac.bd/webportal/ppmv2/uploads/1364120248DC%20Machines
- https://www.eleccompengineering.files.wordpress.com/2014/08/a-textbook-of-electrical-technologyvolume-ii-ac-and-dc-machines-b-l-thferaja.pdf
- https://www.geosci.uchicago.edu/~moyer/GEOS24705/Readings/Klempner_Ch1.pdf
- https://www.ibiblio.org/kuphaldt/electricCircuits/DC/DC.pdf
- https://www.users.ece.cmu.edu/~dwg/personal/sample.pdf.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**1**	**1**	**0**	**2**	**1**	**1**	**0**	**0**	**1**	**1**	**2**	**2**
CO 2	**3**	**3**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**2**	**3**	**2**	**2**
CO 3	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**
CO 5	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**

COURSE CONTENT

DATA STRUCTURES								
II Semester: CSE, CSE(AI&ML), CSE(DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS204ES	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Problem Solving through C Programming								

1. COURSE OVER VIEW

The **"Data Structures through C"** course provides a comprehensive understanding of data structures and their implementation using the C programming language. Students will explore foundational and advanced data structures, including linear lists, stacks, queues, search trees, hash tables, graphs, and tries. The course emphasizes designing and implementing efficient algorithms for operations such as searching, sorting, and pattern matching. By the end of the course, students will be equipped with the skills to solve real-world computational problems and optimize data management using appropriate data structures.

2. COURSE OBJECTIVE

The students will try to Learn:

i. To understand the fundamental concepts of data structures and their applications.
ii. To implement data structures such as arrays, linked lists, stacks, queues, trees, and graphs using C programming.
iii. To design and develop efficient algorithms for searching, sorting, and pattern matching.
iv. To explore advanced data structures like hash tables, tries, and balanced search trees for optimized data organization and retrieval.
v. To strengthen problem-solving and programming skills by applying data structures to real-world computational challenges.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Implement and manipulate fundamental data structures such as arrays, linked lists, stacks, and queues using C.
CO 2	Design and apply efficient algorithms for searching, sorting, and pattern matching.
CO 3	Implement and utilize advanced data structures like hash tables, tries, and balanced search trees to solve computational problems.
CO 4	Develop graph-based solutions using traversal techniques such as BFS and DFS.
CO 5	Apply data structures and algorithms to optimize problem-solving in real-world scenarios.

4. COURSE CONTENT

UNIT-I: **14L**

- 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: **12L**

- 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: **14L**

- Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and
- Deletion, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion,
- Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV: **12L**

- Graphs: Graph Implementation Methods. Graph Traversal Methods.
- Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V: **12L**

- Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the
- Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

5. TEXT BOOKS

i. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.

ii. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

6. REFERENCE BOOKS

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

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	0	0	0	0	0	0	0	0	0	0	3	0
CO 2	3	3	2	2	0	0	0	0	0	0	0	0	2	0
CO 3	3	3	3	2	0	0	0	0	0	0	0	0	2	0
CO 4	3	3	3	2	0	0	0	0	0	0	0	0	2	0
CO 5	3	3	0	3	3	0	0	0	0	0	0	2	2	0

COURSE CONTENT

PYTHON PROGRAMMING LABORATORY								
II Semester: CSE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS205ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVER VIEW

The course focuses on practical Python programming skills through a series of progressively challenging tasks. In the initial weeks, students get familiar with Python basics, including using the interpreter, writing simple programs, and understanding basic functions. As the course advances, students work on more complex problems like matrix operations, file handling, and implementing algorithms. They also explore object-oriented programming concepts, exception handling, and basic GUI development. The course culminates with applications in numerical computing and digital logic, preparing students for real-world problem-solving scenarios.

2. COURSE OBJECTIVE

The students will try to Learn:

1. The implications of disruption and the role of innovation.
2. The various frameworks, tools, and techniques of design thinking.
3. How to design, develop, and implement an innovation product or service or process.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Develop the application specific codes using python.
CO 2	Understand Strings, Lists, Tuples and Dictionaries in Python.
CO 3	Verify programs using modular approach.
CO 4	Verify programs using file I/O, Python standard library.
CO 5	Implement Digital Systems using Python.

4. COURRSE CONTENT

Week -1:

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
ii) Start the Python interpreter and type help () to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.i) Write a program to calculate compound interest when principal, rate and number of periods are given.
ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points.
4. Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2:

1. Print the below triangle using for loop.

```
5
4 4
3 3 3
2 2 2 2
1 1 1 1 1
```

1. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder).
2. Python Program to Print the Fibonacci sequence using while loop.
3. Python program to print all prime numbers in a given interval (use break).

Week - 3:

1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4:

1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.

2. Write a function called has duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.

iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.

3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'

ii) Remove the given word in all the places in a string?

iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

4. Writes a recursive function that generates all binary strings of n-bit length.

Week - 5:

1. i) Write a python program that defines a matrix and prints.

ii) Write a python program to perform addition of two square matrices.

iii) Write a python program to perform multiplication of two square matrices.

2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.

3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.

c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.

d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.

2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.

3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week- 7:

1. Write a Python code to merge two given file contents into a third file.

2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.

3. Write a Python code to Read text from a text file, find the word with most number of occurrences.

4. Write a function that reads a file file1 and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

Week - 8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.

2. a) Install NumPy package with pip and explore it.

3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

4. Write a program to implement Half Adder, Full Adder, and Parallel Adder.

5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

5. TEXT BOOKS

i. Supercharged Python: Take your code to the next level, Overland.
ii. Learning Python, Mark Lutz, O'reilly.

6. REFERENCE BOOKS

i. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
ii. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson.
iii. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition.
iv. Think Python, Allen Downey, Green Tea Press.
v. Core Python Programming, W. Chun, Pearson.
vi. Introduction to Python, Kenneth A. Lambert, Cengage.

7. ELECTRONIC RESOURCES

i. Python Interpreter - https://www.python.org/
ii. https://www.python.org/downloads/release/python-3110/

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**						**3**					**3**		
CO 2		**3**	**3**	**2**										
CO 3				**3**		**3**	**3**		**3**					**3**
CO 4			**3**		**3**						**3**			**3**
CO 5						**3**				**3**	**3**	**3**		**3**

COURSE CONTENT

APPLIED PHYSICS LABORATORY								
I Semester: CE, ME, ECE, CSE(AI&ML), CSE(DS) **II Semester: CSE**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
PH206BS	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes:	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Basic Principles of Physics								

1. COURSE OVER VIEW

This course is designed to introduce B.Tech first-year students to fundamental programming concepts using the C language. It aims to build a strong foundation in computer science through essential programming techniques and problem-solving strategies.

2. COURSE OBJECTIVE

The students will try to Learn:

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the characteristics of dielectric constant of a given material.
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Understanding the method of least squares fitting.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
CO 2	Appreciate quantum physics in semiconductor devices and optoelectronics.
CO 3	Gain the knowledge of applications of dielectric constant.
CO 4	Understand the variation of magnetic field and behavior of hysteresis curve.
CO 5	Carried out data analysis.

4. COURSE CONTENT

LIST OF EXPERIMENTS:

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode.
5. Input and output characteristics of BJT (CE, CB & CC configurations).
6. a) V-I and L-I characteristics of light emitting diode (LED).
   b) V-I Characteristics of solar cell.
7. Determination of Energy gap of a semiconductor.

8. Determination of the resistivity of semiconductor by two probe method.
9. Study B-H curve of a magnetic material.
10. Determination of dielectric constant of a given material.
11. a) Determination of the beam divergence of the given LASER beam.
    b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
12. Determination of work function and Planck's constant using photoelectric effect.

Note: Any 8 experiments are to be performed.

5. REFERENCE BOOK

4. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**2**		**2**	**1**			**1**			**1**	**2**	**1**
CO 2	**2**			**1**					**1**			**1**	**2**	**1**
CO 3		**2**	**3**		**3**	**1**			**3**			**1**	**2**	**1**
CO 4	**3**	**2**	**2**		**2**	**1**			**1**			**1**	**2**	**1**
CO 5	**1**	**1**							**1**			**1**		**1**

COURSE CONTENT

BASICS ELECTRICAL AND ELECTRONICS ENGINEERING LAB								
I Semester: CSE (AI&ML) /CSE(DS) **II Semester: CSE**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EC207ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVERVIEW:

This course serves as a foundation course on electrical engineering. It covers a broad range of fundamental electrical circuits and devices. The concepts of current, voltage, power, basic circuit elements, electrical and electronic devices and their application in more complex electrical systems are to be imparted to the students.

2. COURSE OBJECTIVES:

- To introduce the concepts of electrical circuits and its components.
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits.
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

3. COURSE OUTCOMES:

CO 1	To analyze and solve electrical circuits using network laws and theorems.
CO 2	To understand and analyze basic Electric and Magnetic circuits
CO 3	To study the working principles of Electrical Machines
CO 4	To introduce components of Low Voltage Electrical Installations
CO 5	To identify and characterize diodes and various types of transistors.

4. LIST OF EXPERIMENTS / DEMONSTRATIONS:

PART- A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART-B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

5. TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University.
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education.

6. REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

7. ELECTRONICS RESOURCES:

i. https://www.nptel.ac.in/Courses/117106108
ii. https://www.gnindia.dronacharya.info/EEEDept/labmanuals.html
iii. https://www.textofvideo.nptel.iitm.ac.in
iv. https://www.textofvideo.nptel.iitm.ac.in/

8. MATERIALS ONLINE:

Course template
Lab manual

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**1**	**1**	**0**	**2**	**1**	**1**	**0**	**0**	**1**	**1**	**2**	**2**
CO 2	**3**	**3**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**2**	**3**	**2**	**2**
CO 3	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**
CO 5	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**

COURSE CONTENT

DATA STRUCTURES LAB								
II Semester: CSE, CSE(AI&ML), CSE(DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS208ES	**FOUNDATION**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**1**	**3**	**2**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: 16	Practical Classes: 48				**Total Classes: 64**		
Prerequisite:								

1. COURSE OVER VIEW

The "Data Structures Lab" course introduces students to the practical application of various data structures using the C programming language. It aims to enhance problem-solving skills by teaching students how to implement fundamental data structures like arrays, linked lists, stacks, queues, trees, graphs, and hash tables. The course also focuses on common sorting and searching algorithms, allowing students to efficiently solve real-world problems using C.

2. COURSE OBJECTIVE

The students will try to Learn:

- To write and execute C programs to implement data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables, and search trees.
- To understand and implement various searching and sorting algorithms using C.
- To provide hands-on experience in solving computing problems using appropriate data structures and algorithms.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to

CO 1	Implement data structures such as linked lists, stacks, queues, and trees.
CO 2	Apply searching algorithms like linear and binary search.
CO 3	Implement sorting algorithms like Insertion Sort, Quick Sort, and Radix Sort.
CO 4	Develop and manage binary search trees and hash tables.
CO 5	Use recursion and iteration for tree traversal and data manipulation.

4. COURSE CONTENT

Practice Sessions:

1. Write a program that uses functions to perform the following operations on singly linked list.:

   i) Creation ii) Insertion iii) Deletion iv) Traversal

2. Write a program that uses functions to perform the following operations on doubly 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) Quick sort ii) Heap sort iii) Merge sort

7. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
8. Write a program to implement

   i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees

9. Write a program to implement the graph traversal methods.
10. Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

5. TEXT BOOKS

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

6. REFERENCE BOOKS

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

7. ELECTRONIC RESOURCES

i. CodeLite: https://codelite.org/ Code:Blocks:
ii. http://www.codeblocks.org/ DevCpp
iii. http://www.bloodshed.net/devcpp
iv. html Eclipse: http://www.eclipse.org

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**2**	**3**			**2**								**3**	
CO 2		**3**	**2**										**3**	
CO 3			**3**										**3**	
CO 4				**2**						**1**	**1**		**3**	
CO 5					**3**							**1**	**3**	

COURSE CONTENT

ENGINEERING WORKSHOP								
II Semester: CSE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
ME209ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVER VIEW

To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude. Ability to design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint.

2. COURSE OBJECTIVES:

- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at workplace.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

3. COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO 1	Study and practice on machine tools and their operations.
CO 2	Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
CO 3	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.
CO 4	Apply basic electrical engineering knowledge for house wiring practice.

4. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit &Semi-circular fit)
III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding & Gas Welding)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

5. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working and CNC Lathe turning.

6. TEXT BOOKS:

1. Workshop Practice /B.L.Juneja / Cengage.
2. Workshop Manual / K.Venugopal / Anuradha.

7. REFERENCE BOOKS:

1. Workshop Manual-P.Kannaiah / K.L.Narayana / Scitech.
2. Workshop Manual / Venkat Reddy/BSP.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**3**	**1**		**1**		**1**	**1**			**1**	**3**	**2**
CO 2	**3**	**3**	**3**	**1**		**1**		**1**	**1**			**1**	**3**	**2**
CO 3	**3**	**3**	**3**	**1**		**1**		**1**	**1**			**1**	**3**	**2**
CO 4	**3**	**3**	**3**	**1**		**1**		**1**	**1**			**1**	**3**	**2**

COURSE CONTENT

CONSTITUTION OF INDIA								
II Semester: ME / CE / ECE / CSE (AI & ML) / CSE / CSE (DS)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
MC210	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	-	-	-	-	-
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: Nil**		
Prerequisite:								

1. COURSE OBJECTIVES:

The students will try to Learn:

i. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
ii. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
iii. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

2. COURSE OUTCOMES

At the end of the course students should be able to:

CO 1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO 2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO 3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
CO 4	Discuss the passage of the Hindu Code Bill of 1956.

3. SYLLABUS:

UNIT–I:

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

UNIT-II:

Philosophy of the Indian Constitution- Preamble Salient Features.

UNIT-III:

Contours of Constitutional Rights & Duties - Fundamental Rights.

- Right to Equality
- Right to Freedom

- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT–IV:

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–V:

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 Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT–VI:

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.

4. SUGGESTED READING:

i. The Constitution of India, 1950 (Bare Act), Government Publication.
ii. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
iii. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
iv. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.