Multidisciplinary Courses (MDC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EE001	Basic Electrical & Electronics Engineering	FC	2		2	4	50	50	100	-
241IT001	IT & AI Skills	FC			2	2	50	50	100	-
241CS001	Programming for Problem Solving using C	FC	2		2	4	50	50	100	-
Total			**4**		**6**	**10**				

Basic Electrical & Electronics Engineering

	L	T	P	C
Course Code: 241EE001	**2**	**0**	**2**	**4**

Course Outcomes:

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

- **CO 1:** Analyze the concepts associated to AC and DC circuits.
- **CO 2:** Explain the operating principles of motors, generators and measuring instruments.
- **CO 3:** Analyze the Different Energy Resources and Equipment Safety Measures.
- **CO 4:** Explain the concept and the applications of semiconductor Diodes.
- **CO 5:** Analyze the basic electronic circuits and interpret numeric information in different code formats.

Mapping of course outcomes with program outcomes:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	3	1	-	1	-	-	-	2	2	-
CO2	2	3	1	-	-	-	-	-	2	2	-
CO3	3	2	1	-	-	-	-	-	2	2	-
CO4	3	2	1	-	-	-	-	-	2	2	-
CO5	3	2	1	-	-	-	-	-	2	2	-

Mapping of course outcomes with program Specific Outcomes:

CO\PSO	PSO1	PSO2
CO1	1	-
CO2	1	-
CO3	1	-
CO4	1	-
CO5	1	-

UNIT-I

DC and AC Circuits:

DC circuits: Ohm's and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits excited by independent voltage sources for R, L, C parameters, current division, voltage division

AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form, and peak factors. Real power, reactive power, apparent power, and Power factor.

PRACTICE:

1. Verification of Ohm's Law.
2. Verification of KCL and KVL.
3. Verification of KCL, KVL and ohm's law using simulation.

UNIT-II

Machines and Measuring Instruments:
Principles and operation of DC machines, Transformers – Synchronous Machines - three Phase and single phase induction motors - Moving coil and moving iron instruments, Wheatstone bridge and Megger.

PRACTICE:

1. To study Magnetisation Characteristics of DC shunt generator
2. Measurement of Power and Power factor using Single-phase wattmeter
3. Measurement of Resistance using Wheat stone bridge
4. MeasurementofEarthResistanceusingMegger.

UNIT-III

Energy Resources, Electricity Bill and Safety Measures
Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Thermal, Solar and Wind power generation. Calculation of electricity bill for domestic appliances. Working principle of Fuse and Miniature circuit breaker (MCB). Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

PRACTICE:

1. Calculation of Electrical Energy for Domestic Premises

UNIT-IV

SEMICONDUCTOR DEVICES
Intrinsic semiconductors – Extrinsic semiconductors - P type and N type - P-N junction characteristics of P N Junction Diode — Zener Effect — Zener Diode and its Characteristics. working of simple zener voltage regulator and amplifier- Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics.

PRACTICE:

1. Sketch the V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Sketch the V-I characteristics of Zener Diode and its application as voltage Regulator
3. Plot Input and Output characteristics of BJT in CE and CB configurations.
4. Obtain Frequency response of CE amplifier.

UNIT-V

BASIC ELECTRONIC CIRCUITS

Block diagram description of a dc power supply, working of a half and full wave, bridge rectifier, filters.

DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adders

PRACTICE:

1. Implementation of half wave and full wave rectifiers.
2. Design Half Adder and Full Adder circuits.
3. Verification of truth table for Logic gates using ICs.

Text Books:

1. "Basic Electrical and Electronics Engineering", Salivahanan S, Tata McGraw Hill Education (India) Private Limited, New Delhi, ISBN: 9789389691801.
2. "Principles of Electrical Engineering", V. K. Mehta, R. Mehta, S. Chand and Company Ltd., New Delhi (ISBN-13: 9788121930888).
3. "Digital Fundamentals", Thomas Floyd, Prentice Hall, 10th Edition (ISBN: 9780132737968).

Reference Books:

1. "Electronic Devices and Circuit Theory", Robert L. Boylestad and Louis Nashelsky, 11/e Pearson (ISBN: 9780135026496).
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai and Co (ISBN: 9788177000207).

Web Links:

1. https://nptel.ac.in/courses/108/101/108101091/ (NPTEL Video by Dr.Mahesh B. Patil from IIT Bombay)
2. https://nptel.ac.in/courses/117/106/117106108/ (NPTEL Video by Prof. Nagendra Krishnapura from IIT Madras)

IT & AI Skills

(Common to CE, EEE, ME, ECE, CSE, IT, AIML, CSE(DS), PT & Min.E)

	L	T	P	C
Course Code: 241IT001	**0**	**0**	**2**	**2**

Course Outcomes:

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

CO1: Utilize Excel and Power BI for data analysis, visualization, and reporting.

CO2: Apply various data analysis techniques in Excel and Power BI to extract meaningful insights from datasets

CO3: Create clear and compelling visualizations using Excel and Power BI to communicate data-driven insights.

CO4: Develop data models in Power BI to organize and analyze data efficiently.

CO5: Design interactive dashboards in Power BI to facilitate data exploration and decision-making.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	2	2	-	-	2	-	-	-	1	1	1
CO2	2	3	-	-	2	-	-	-	1	1	2
CO3	2	2	-	-	2	-	-	-	1	1	2
CO4	1	2	1	-	2	-	-	-	1	1	2
CO5	1	2	1	-	2	-	-	-	1	1	2

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	1	2
CO2	2	1
CO3	2	2
CO4	1	2
CO5	2	2

Practice

1. Introduction to Excel

a. Overview of Excel and its capabilities for data analysis
b. Basics of Excel: Navigating the interface, entering data, formatting cells
c. Introduction to functions and formulas: SUM, AVERAGE, IF, VLOOKUP, etc.
d. Importing data into Excel from different sources: CSV, text files.

2. Data Analysis with Excel

a. Data manipulation techniques: Sorting, filtering, and grouping data
b. Advanced functions and formulas: INDEX/MATCH, SUMIFS, COUNTIFS, etc.
c. Data visualization with Excel: Creating charts and graphs
d. Using PivotTables for data summarization and analysis

3.Advanced Excel Features

a. Introduction to Excel tables and structured references
b. Working with named ranges and dynamic ranges

c. Excel data validation techniques

4. Introduction to Power BI
a. Overview of Power BI and its advantages over Excel for large datasets
b. Installing Power BI Desktop
c. Understanding the Power BI interface: Navigation, ribbons, and panes
d. Importing data into Power BI Desktop from various sources

5. Data Preparation in Power BI
a. Introduction to Power Query for data transformation
b. Cleaning, shaping, and filtering data in Power Query Editor

6. Data Preparation in Power BI
a. Combining data from different sources
b. Loading data into Power BI model.

7. Data Modeling in Power BI
a. Understanding relationships between tables
b. Creating calculated columns and measures using DAX

8. Data Modeling in Power BI
a. Introduction to DAX functions: CALCULATE, FILTER, RELATED, etc.
b. Working with date and time functions in DAX

9. Visualization Basics in Power BI
a. Creating basic visualizations: Bar charts, line charts, pie charts, etc.
b. Customizing visualizations: Formatting, titles, legends, etc.

10. Visualization Basics in Power BI
a. Using slicers and filters to interact with visualizations
b. Adding drill-down capabilities to visualizations

11. Advanced Visualizations and Dashboards in Power BI
a. Exploring advanced visualizations: TreeMap, Waterfall chart, KPIs, etc.
b. Creating custom visuals from the marketplace

12. Advanced Visualizations and Dashboards in Power BI
a. Designing effective dashboards: Layout, arrangement, and organization
b. Adding interactivity with bookmarks and drill-through

Additional Practice:

1. **Basic Data Analysis:** Import a dataset into Excel and perform basic data analysis tasks such as sorting, filtering, and creating simple charts to visualize the data.

2. **Expense Tracker:** Create a spreadsheet to track your expenses. You can have columns for date, item description, category, and amount. Use formulas to calculate totals and analyze your spending habits.

3. **Data modeling and extracting statistics from dataset:** Connecting Power BI to

local data files and cloud servers (COVID19 dataset will be imported into the Power BI for visualization).

Text Books:

1. Learn Power BI - Second Edition: A comprehensive, step-by-step guide for beginners to learn real-world business intelligence 2nd Edition, ISBN: 9781801811958.

2. Power BI Beginner: Zero to Hero in Power BI Desktop by Philip Seamark, ISBN 1691641227.

Reference Books:

1. Power BI Quick Start Guide: Build dashboards and visualizations to make your data come to life by Devin Knight and Siddharth Mehta.

2. Learn Power BI: A Beginner's Guide to Analyzing Data and Creating Reports with Power BI by Murilo Miranda.

Web Links:

1. https://learn.microsoft.com/en-us/power-bi/
2. https://support.microsoft.com/en-us/excel
3. https://cce.sydney.edu.au/course/MSE1
4. https://cce.sydney.edu.au/course/PBBA

Programming for Problem Solving using C

(Common to CE, EEE, ME, ECE, CSE, IT, AIML, CSE(DS), PT & Min.E)

	L	T	P	C
Course Code: 241CS001	**2**	**0**	**2**	**4**

Course Outcomes: At the end of the Course, Student will be able to:

- **CO1:** Demonstrate basics of computer, algorithm and flow chart for problem solving.
- **CO2:** Make use of an appropriate control structures to solve given problems.
- **CO3:** Solve complex problems using arrays and strings.
- **CO4:** Develop modular programming using functions and dynamics memory allocations using pointers.
- **CO5:** Demonstrate file handling using file operations.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	2	3	2	1	3	-	-	2	-	-	1
CO2	2	3	2	1	3	-	-	2	-	-	1
CO3	2	3	2	1	3	-	1	2	-	-	1
CO4	2	3	2	1	3	-	1	2	-	-	1
CO5	2	3	2	1	3	-	1	2	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2

UNIT – I

Introduction to Programming and Problem Solving

Introduction to Programming Languages, Basics of a Computer Program- Algorithms, Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms. flowcharts (Using Dia Tool), pseudo code. Structure of C Program Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, operators, keywords, identifiers, Type Conversion, and Casting.

Practice:

1.

   a. Basic linux environment and its editors like Vi,Vim & Emacs etc.
   b. Exposure to turbo C, gcc
   c. Explore to hacker rank or any other Online coding platform and compiler environment.
   d. “Hello world” in C
   e. Objective: Learn about the syntax of reading from stdin and writing to stdout.

https://www.hackerrank.com/challenges/hello-world-c/problem?isFullScreen=true e
Write a simple program to read int, float, char and string using scanf() and display using printf() in all the above given platforms.

2. Basics and Operators

   a. Sum and Difference of 2 numbers
      Objective: Learn int and float data types.
      https://www.hackerrank.com/challenges/sum-numbers-c/problem?isFullScreen=true
   b. Playing with Characters
      Objective: Learn how to take a character, a string and a sentence as input in C.
      https://www.hackerrank.com/challenges/playing-with-characters/problem?isFullScreen=true
   c. Bitwise Operators
      Objective: Learn how to work with bits (0,1) and bitwise operators.
      https://www.hackerrank.com/challenges/bitwise-operators-in-c/problem?isFullScreen=true
   d. Conversion of Fahrenheit to Celsius and vice versa.
   e. Distance travelled by an object.
   f. Calculate Simple interest and compound interest.

3. Operators and Expressions, Variables and Type conversions

   a. Evaluate the following expressions

      i. a/b*c-b+a*d/3
      ii. j = (i++) + (++i)
   b. Square root of a given number.

   c. Find the area of circle, square, rectangle and triangle.

   d. Find the maximum of three numbers using conditional operator.

   e. Take marks of 5 subjects in integers, find the total in integer and average in float.

UNIT – II

Control Structures
Simple sequential programs Conditional Statements (if, if-else, else if ladder, switch), Loops (for, nested for loop, while, do-while) break and continue, goto statement

Practice:

1. Conditional Statements

   a. Objective: Understand if and else Conditional statements in C.
      https://www.hackerrank.com/challenges/conditional-statements-in-c/problem?isFullScreen=true

   b. Roots of a Quadratic Equation.

c. Generate electricity bill.

d. Simulate a calculator using switch case.

e. Find the given year is a leap year or not.

2. Loops

a. Objective: Learn the usage of the for loop in C.
https://www.hackerrank.com/challenges/for-loop-in-c/problem?isFullScreen=true

b. Sum of the digits of a 5-digit number.
Objective: Learn the usage of while loop and usage of operators - % and /.
https://www.hackerrank.com/challenges/sum-of-digits-of-a-five-digit-number/problem?isFullScreen=true

c. Given number is a prime or not. (Also Prime numbers between a given range.)

d. Armstrong Number or not.

e. Palindrome or not.

f. Objective: Print a pattern of numbers using Loops.
https://www.hackerrank.com/challenges/printing-pattern-2/problem?isFullScreen=true

g. Construct a Pyramid pattern.

UNIT – III

Arrays indexing, Accessing programs with array of integers, two dimensional arrays, Introduction to Strings, string handling functions.
Sorting techniques: bubble sort, selection sort.
Searching Techniques: linear, Binary search.

Practice:

1. Arrays

a. Objective: Print the sum and free the memory where the array is stored.
https://www.hackerrank.com/challenges/1d-arrays-in-c/problem?isFullScreen=true

b. Objective: Working with indices in array
https://www.hackerrank.com/challenges/reverse-array-c/problem?isFullScreen=true

c. Search an element in array (Linear Search)

d. Find min and max elements in array

e. Insert an element into array

f. Eliminate duplicate elements from array

g. Sorting of elements in an array using Bubble sort

2. Arrays

a) Sum of two 2-D arrays

b) Multiplication of two 2-D arrays

c) Transpose of a Matrix

d) Trace of a Matrix

e) Lower Triangular Matrix

3. Hacker Rank

a) Objective: print each word of the sentence in a new line.
https://www.hackerrank.com/challenges/printing-tokens- /problem?isFullScreen=true

b) Count number of alphabets (lowercase, uppercase, consonants, vowels) and digits Lowercase to Uppercase, Uppercase to Lowercase, Toggle case, Sentential case

c) Objective: Digit Frequency Objective: find the frequency of each digit in the given string.
https://www.hackerrank.com/challenges/frequency-of-digits-1/problem?isFullScreen=true

d) Find string length, concatenate 2 strings, reverse a string using built-in and without built-in string functions.

UNIT – IV

Functions: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, arrays as parameters, Scope and Lifetime of Variables, storage class, recursion, functions & pointers, functions and arrays.

Practice: Functions in C

1. Objective: Learn simple usage of functions.
https://www.hackerrank.com/challenges/functions-in-c/problem?isFullScreen=true

2. Objective: Fibonacci Numbers using recursive function.
https://www.hackerrank.com/challenges/ctci-fibonacci-numbers/problem

3. Objective: N^{th} factorial using recursion.

https://www.hackerrank.com/contests/ccc-veltech-practice-set-ende/challenges/factorial-using-recursion-1

4. Objective: Find the super digit of the integer.
https://www.hackerrank.com/challenges/recursive-digit-sum/problem

5. Implement LCM

6. Objective: Calculate the Nth term of series.

https://www.hackerrank.com/challenges/recursion-in-c/problem?isFullScreen=true

UNIT – V

Introduction to Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, modifying parameters inside functions using pointers, Command line Arguments, Dynamic memory allocation, Null Pointer, generic pointer, dangling pointer
File Handling:-Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

Practice:

1. Pointers

   a) Objective: learn to implement the basic functionalities of pointers in C.
   https://www.hackerrank.com/challenges/pointer-in-c/problem?isFullScreen=true

   b) Objective: Learn using Pointers with Arrays and Functions
   https://www.hackerrank.com/challenges/students-marks-sum/problem?isFullScreen=true

   c) Objective: sort a given array of strings into lexicographically increasing order or into an order in which the string with the lowest length appears first.

   https://www.hackerrank.com/challenges/sorting-array-of-strings/problem?isFullScreen=true

   d) Find the sum of a 1D array using malloc()

   e) Swap two numbers using functions and pointers - call by value and reference.

   f) Objective: Dynamic Handling requests by a Librarian to place the books in the shelves.
   https://www.hackerrank.com/challenges/dynamic-array-in-c/problem?isFullScreen=true

2. File handling concepts

   a) Write text into and read text from a file.

   b) Write text into and read text from a binary file using fread() and fwrite().

   c) Copy the contents of one file to another file.

   d) Merge two files into the third file using command-line arguments

   e) Find no. of lines, words and characters in a file.

Additional Practice:

1. Variadic functions in C
   Objective: Understanding variable number of arguments
   https://www.hackerrank.com/challenges/variadic-functions-in-c/problem?isFullScreen=true

2. Small Triangles, Large Triangles
   Objective: Print sorted by their areas
   https://www.hackerrank.com/challenges/small-triangles-large-triangles/problem?isFullScreen=true

3. Permutations of Strings
   Objective: print all strings permutations in strict lexicographical order

https://www.hackerrank.com/challenges/permutations-of-strings/problem?isFullScreen=true

Text Books:

1 Programming in C, Rema Theraja, Oxford, 2nd edition. ISBN 93-5497-9

2 "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall. ISBN 13: 9780131103627

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education. ISBN.No: 9352604172
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill. ISBN No. 0071367993
3. Let Us C Yashwanth,Kanetkar, Eighth edition, BPB Publications.ISBN No. 1934015253
4. Programming in C A-Practical Approach Ajay Mittal. Pearson Education.ISBN No. 9788131729342
5. R G Dromey How to Solve It by Computer (Prentice-Hall International Series in Computer Science.ISBN-13 : 978-0134340012

Web Links:

1 https://www.hackerrank.com/

2 https://onlinecourses.nptel.ac.in/noc22_cs40/preview

3 https://archive.nptel.ac.in/courses/106/104/106104128/