Course code: Course Title	Course Structure			Pre-Requisite
AC101:Applied Chemistry	**L**	**T**	**P**	**NIL**
	3	**0**	**2**	

Course Objective: To familiarize the students with the concepts of engineering chemistry, material characterization and green chemistry.

S. NO	Course Outcomes (CO)
CO1	Describe the essential requirements of water and its importance in industry.
CO2	Differentiate between analytical methods.
CO3	Describe the basics of polymers, their applications in industry and recent advancements in the polymer field.
CO4	Apply the concepts of electrochemistry in energy storage devices.
CO5	Demonstrate the concepts of phase, component and degree of freedom, Gibb's phase rule.
CO6	Describe and apply the principles of green chemistry.

S. NO	Contents	Contact Hours
UNIT 1	Water Analysis: Titrimetric Analysis of Water (Alkalinity, Hardness, Dissolved Oxygen, Chlorine), Applications of Different Indicators, Theories of Indicators, Boiler Feed Water, Boiler Troubles and their Treatments.	8
UNIT 2	Analytical Methods UV-visible, IR: Principles and Applications. Thermo-gravimetry, Differential Thermal Analysis and Differential Scanning Calorimetry: Principles and Applications.	8
UNIT 3	Polymers: Functionality and Degree of Polymerization, Mechanism of Polymerization, Molecular Weights of Polymers, Conducting Polymers (Polyaniline, Polypyrrole, Polyacetylene) Industrial applications of Polymers.	8
UNIT 4	Electrochemistry: Primary and Secondary battery systems, Zinc-Carbon cells, Lead storage and lithium batteries. Fuel Cells, Recent Advancement in Batteries	6
UNIT 5	Phase Equilibrium: Definitions of Phase, component and degree of freedom, Gibb's phase rule. One component system: Water and sulphur. Two component systems: Pb-Ag and Cu-Ni.	8
UNIT 6	Green Chemistry: Principles of Green Chemistry; Numerical on atom economy; Examples of Green Methods of Synthesis, Reagents and Reactions, Evaluation of feedstock, Future trends in Green Chemistry.	4
	TOTAL	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Thermal Analysis: Fundamentals and Applications to Polymer Science; T. Hatakeyama, F. X. Quinn, Wiley.	1999
2	Inorganic Quantitative Analysis; A. I. Vogel .	1951
3	Instrumental Methods of Analysis; Skoog D. A., HRW international.	1998
4	Engineering Chemistry; R. N. Goyal, H. Goel, Ane Books India.	2009
5	Engineering Chemistry; S. S. Dara, S. Chand.	2013
6	Polymer Science; V. Gowarikar, R. Sreedharan, New Age International.	2021
7	New Trends in Green Chemistry; V. K. Ahluwalia, M. Kidwai, Anamaya publication.	2004
8	Green Chemistry: Theory and Practice; P. T. Anastas, J. C. Warner, Oxford University Press	2000

Syllabi of Engineering Science Courses (ESC)

Programming Fundamentals

Course code: Course Title	Course Structure			Pre-Requisite
CO101/CO102: Programming Fundamentals	L	T	P	Basic Mathematics
	3	0	2	

Course Objective: The objective of the course is to understand the basic principles of programming languages and provide design & development basic programming skills. This course also introduces problem solving methods and program development.

S. NO	Course Outcomes (CO)
CO1	Design algorithmic solutions for use on computers. Approach the programming task using procedural and Object-Oriented Programming techniques.
CO2	Write constructs for console input and output, apply basic operators, and perform sequential Processing, utilize the basic control.
CO3	Apply decision structures, loops, storage class and functions.
CO4	apply data in arrays, pointers, and data files.
CO5	Develop effective and efficient programs in C and C++.

S. NO	Contents	Contact Hours
UNIT 1	Introduction: Concepts of algorithm, flow chart, Basics of Computer Languages, Compilers, Interpreter, Programming Environments and Debugging: types of errors and debugging techniques. Program design techniques: Structured, modular, Bottom-up, top-down, procedural, OOP Programming features: Data types, Expressions and Operators-Arithmetic, unary, logical, bitwise, relational, assignment, comma operators. Data conversions. Input/Output statements.	9
UNIT 2	Control statements: While, do-while, for statements, nested loops, if else, switch, break, Continue, and goto statements, Iterations. Concept of subprograms. Functions: Storage class -Scope and extent of variables, Argument types- actual, formal, dummy. Function definition, declaration, prototype. Recursion.	8
UNIT 3	Pre-processor directives: headers and library functions, macros. Array: Array representation, Operations on array elements, using arrays, multidimensional arrays. Strings, operations on strings. Structures & Unions: Declaration and usage of structures and Unions.	8
UNIT 4	Pointers: Pointer and address arithmetic, pointer operations and declarations, pointer and arrays, pointer to structure. Call by value, call by reference. Dynamic memory allocation. Sorting and searching algorithms: selection sort, bubble sort, insertion sort, and linear and binary search.	9
UNIT 5	File Handling: Declaration of files, types of files File pointer. File input/ output and usage, File operation Introduction to Object Oriented Programming: OOPS concepts, OOP languages- C++, Python etc.	8
	TOTAL	**42**

REFERENCES		
S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint

1	C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall 2nd Edition. ISBN-13 - 978-0131103627	1988
2	C Programming for Beginners - The C Guru	2016
3	Let us C by Kanetkar, Y BPB Publications, 15th edition .	2016
4	Modern C by Jens Gustedt – Icube	2015
5	C Programming : The Ultimate Way to Learn The Fundamentals of The C Language by Harry. H. Chaudhary.	2014
6	Mastering C, Venugopal K R, Sudeep R Prasad, Edition 1,McGraw Hill Education. ISBN-13 : 978-9332901278	2017
7	Programming in ANSI C by E Balagurusamy , McGraw Hill Education (India) Private Limited Sixth Edition. ISBN-13 : 978-1259006821	2013
8	Conceptive C by Harry McGeough - Smashwords	2011

Basic Civil Engineering (BCE)