SHRI VENKATESHWARA UNIVERSITY

Syllabus
B.TECH
Computer Science & Engineering
III SEMESTER

(Four Years Degree Programme)
Batch 2019-23
(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

		Computer Science & Engineering SEMESTER- III											
Sl. No.	**Subject Codes**	**Subject**	**Periods**			**Evaluation Scheme**				**End Semester**		**Total**	**Credit**
			L	**T**	**P**	**CT**	**TA**	**Total**	**PS**	**TE**	**PE**		
1	**SEC – 301**	Analog Electronic Circuits	3	0	0	20	10	30		70		100	3
2	**SEC-302**	Data structure & Algorithms	3	0	0	20	10	30		70		100	3
3	**SEC – 303**	Digital Electronics	3	0	0	20	10	30		70		100	3
4	SCS- 304	Object Oriented Programming using C++	3	0	0	20	10	30		70		100	3
5	**SSC-305**	Mathematics III(Differential Calculus)	2	0	0	20	10	30		70		100	2
6	SHM-301	Effective Technical Communication	3	0	0	20	10	30		70		100	3
7	**SEC – 311**	Analog Electronic Circuits Lab	0	0	4				25		25	50	2
8	**SEC-312**	Data structure & Algorithms Lab	0	0	4				25		25	50	2
9	**SEC – 313**	Digital Electronics Lab	0	0	4				25		25	50	2
10	SCS- 314	Object Oriented Programming using C++ Lab	0	0	2				25		25	50	1
												800	**24**

SEC – 301	Analog Electronic Circuits	3L:0T:0P	3 credits

Objectives of the course:
1. To learn the fundamentals of analog electronic circuits.
2. To design, construct and debug the analog electronic circuits.
3. Principles of operation, terminal characteristics, and equivalent circuit models for diodes, transistors and op-amps.
4. Differential amplifiers, frequency response of cascaded amplifiers and gain-bandwidth considerations.
5. Linear and nonlinear applications of op-amp.

Module 1   Lectures: 4 hrs.

Diode circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

Module 2   Lectures: 8 hrs.
BJT circuits: Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: Small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits.

Module 3   Lectures: 8 hrs.
MOSFET circuits: MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency equivalent circuit.

Module 4   Lectures: 8 hrs.
Differential, multi-stage and operational amplifiers: Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp,non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

Module 5   Lectures: 8 hrs.
Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion.

Module 6   Lectures: 6 hrs.
Nonlinear applications of op-amp: Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector, Monoshot.

Suggested Books:

1. A S Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
5. P.R. Gray, R.G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 2001.

| SEC-302 | Data Structure & Algorithms | 3L:0T: 0P | 3 credits |

Objectives of the course:
To impart the basic concepts of data structures and algorithms.
To understand concepts about searching and sorting techniques
To understand basic concepts about stacks, queues, lists, trees and graphs.
To enable them to write algorithms for solving problems with the help of fundamental data
structures

Module 1:
Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure
Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic
Notations, Time-Space trade off.
Module 2:
Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis,
Applications of Stacks: Expression Conversion and evaluation – corresponding
algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular
Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.
Module 3:
Linked Lists: Singly linked lists: Representation in memory, Algorithms of several
operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked
representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and
algorithmic analysis; Circular Linked Lists: all operations their algorithms and the
complexity analysis.
Module 4:

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary
Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their
algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree:
definitions, algorithms and analysis.
Module 5:

Searching, Sorting and Hashing: Linear Search and Binary Search Techniques and their
complexity analysis. Objective and properties of different sorting algorithms: Selection
Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and
Comparison among all the methods, Hashing.
Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and
complexity analysis.

Suggested books:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni,
Computer Science Press.

Suggested reference books:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by
Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

SEC – 303	Digital Electronics	3L:0T: 0P	3 credits

Course Outcomes:
At the end of this course, students will demonstrate the ability to:
1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Be able to use Programmable logic devices to implement the given logical problem.

Module 1   Lecture: 7 hrs.

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri - state logic.

Module 2   Lecture: 7 hrs.

Combinational Digital Circuits: Standard representation for logic functions K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, DeMultiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

Module 3   Lecture: 7 hrs.
Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

Module 4   Lecture: 7 hrs.
A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using Voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

Module 5   Lecture: 7 hrs.
Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips,

ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

Suggested books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

SCS- 304	**Object Oriented Programming using C++**	**3L:0T: 0P**	**3 credits**

Objectives of the course:
1. To impart the basic concepts of Object Oriented Programming.
2. To understand concepts about Classes and Data Abstraction
3. To understand basic concepts about Inheritance.
4. To enable them to write algorithms for solving problems using object oriented approach.

Detailed contents:

Module 1   **Lecture: 3 hrs.**
Introduction to C++ : Object Oriented Technology, Advantages of OOP, Input- output in C++, Tokens, Keywords, Identifiers, Data Types C++, Derives data types. The void data type, Type Modifiers, Typecasting, Constant, Operator, Precedence of Operators, Strings.

Module 2   Lecture: 6 hrs.
Control Structures and Functions: Decision making statements like if-else, Nested if-else, goto, break, continue, switch case, Loop statement like for loop, nested for loop, while loop, do-while loop. Parts of Function, User- defined Functions, Value- Returning Functions, void Functions, Value Parameters, Function overloading, Virtual Functions.

Module 3   Lecture: 12 hrs.
Classes and Data Abstraction : Structure in C++, Class, Build- in Operations on Classes, Assignment Operator and Classes, Class Scope, Reference parameters and Class Objects (Variables), Member functions, Accessor and Mutator Functions, Constructors, default Constructor, Destructors.

Module 4   Lecture: 8 hrs.
Overloading, Templates and Inheritance: Operator Overloading, Function Overloading, Function Templates, Class Templates. Single and Multiple Inheritance, virtual Base class, Abstract Class, Pointer and Inheritance, Overloading Member Function.

Module 5   Lecture: 11 hrs.
Pointers, Arrays and Exception Handling: Void Pointers, Pointer to Class, Pointer to Object, Void Pointer, Arrays. The keywords try, throw and catch. Creating own Exception Classes, Exception Handling Techniques (Terminate the Program, Fix the Error and Continue, Log the Error and Continue), Stack Unwinding.

Suggested books:
1. Thinking in C++, Volume 1 & 2 by Bruce Eckel, Chuck Allison, Pearson Education
2. Mastering C++, 1/e by Venugopal, Tata McGraw Hill.
3. Object Oriented Programming with C++, 3/e by E. Balaguruswamy, Tata McGraw Hill.
4. Starting Out with Object Oriented Programming in C++, by Tony Gaddis, Wiley India.

Suggested Reference Books:

1. The C++ Programming language 3/e by Bjarne Stroustrup, Pearson Education.
2. C++, How to Programme, 4e, by Deitel, Pearson Education.
3. Big C++ by Cay Horstmann, Wiley India.
4. C++ Primer, 3e by Stanley B. Lippmann, JoseeLajoie, Pearson Education.
5. C++ and Object Oriented Programming Paradigm, 2e by Debasish Jana, PHI.
6. Programming with C++, 2/e by Ravichandran, Tata McGraw Hill.
7. C++ Programming Black Book by Steven Holzner, Dreamtech Press.

SSC-305	Mathematics-III (Differential Calculus)	2L:0T:0P	2 credits

Detailed contents:

Module 1 Lecture: 6 hrs.
Successive Differentiation, Leibnitz's Theorem. Limit Continuity and Differentiability of function for one variable.

Module 2   Lecture: 8 hrs.
Limit Continuity and Differentiability of function for several variables. Partial Derivatives, Euler's Theorem for Homogeneous functions, Total derivatives, Change of Variables. Maxima and Minima of Several Variables. Methods of Lagrange Multipliers. Taylor's and Maclaurin's Theorem with remainders of several variables.

Module 3   Lecture: 8 hrs.
Vector Calculus: Gradient, Divergence and Curl of a Vector and their Physical Interpretations, Vector Identities. Directional Derivatives. Line, Surface and Volume integrals, Application of Green's, Stokes and Gauss Divergence Theorem (Without Proof).

Module 4   Lecture: 6 hrs.
First Order Ordinary Differential Equations: Exact, Linear and Bernoulli's Equations, Euler's Equations, Equations not of First Degree: Equations Solvable for P, Equations Solvable for Y, Equations Solvable for X and Clairaut's Type.

Module 5   Lecture: 8 hrs.
Ordinary Differential Equations of Higher Orders: Second Order Linear Differential Equations with Variable Coefficients, Method of Variation of Parameters, Cauchy-Euler Equation; Power Series Solutions; Legendre Polynomials, Bessel Functions of the First Kind and their properties.

Module 6   Lecture: 6 hrs.
Partial Differential Equations – First Order: First Order Partial Differential Equations, Solutions of First Order Linear and Non-Linear PDEs.

SHM-301	Effective Technical Communication	3L:0T: 0P	**3 credits**

Objectives of the course:

1. To understand the variety of structure of technical documents

2. To convey clearly, cogently and correctly, through written media, the technical aspects of a practice to audiences.

3. To recognize and use of the verbal and technical elements necessary for the successful practice of scientific and technical communication

4. To work collaboratively and individually to research, to analyze, and to write about, public debates regarding the conduct of science and technology

Detail contents

Module 1   **Lecture 10 hrs.**
Introduction: Fundamentals of Technical Writing: Need for Clear and Concise Technical Writing, Attributes of Technical Writing, Types of Technical Writing, Benefits of Technical Writing, Technical, Managerial and General Readers, Expressing versus Impressing, Correct use of Noun, Pronoun, Verb, Adjective, Adverbs, Tense and Punctuation.

Module 2   Lecture 10 hrs.
Performing Technical Studies: Types of Technical Studies, General Methodology-Proposing a Project, Gathering Background Information, Designing Test Plans, Performing Experiments, Reporting Results. **Writing Strategy:** Analysis of Readers, Scope of Writing, Purpose and Objective. **Document Options:** Document Hierarchy, Report Types and Selection.
Criteria for Good Technical Writing: Technical Content, Presentation, Language Skills. **Writing Style:** Elements of Style, Examples of Writing Styles, Recommended Style, Learn to Prepare Effective Illustrations

Module 3   Lecture 10 hrs.
Formal Reports: The Outline and Introduction (Outline, Title, Front Matter, Writing the Introduction), Writing the Body (Writing a Procedure, Describing Machines/Processes, Writing Test Results, Writing the Discussion Section), Closure (Conclusions, Recommendations, References, Abstract, Back Matter, Report Distribution, Saving Reports). **Informal Reports:** Elements of an Informal Report, Investigation Reports, Service Work, Action Letters and Proposals. Typical Memo Reports.

Module 4   Lecture 10 hrs.
Review and Editing: Types of Review and Edit, Review and Editing Methodology, Examples of Reviews. **Oral Presentations:** Types of Oral Presentations, Preparation, Visual Aids, Impediments to Technical Writing, Maintaining Writing Skills, Measuring Report Results.

Suggested books:
1. "Engineers' Guide to Technical Writing", Kenneth G. Budinski, ASM International.
2. "Handbook for Technical Writing", James H. Shelton, NTC Contemporary Press
3. "The Technical Writer's Handbook: Writing With Style and Clarity", Matt Young, University Science Books
Suggested reference books:
1. "A Guide to Technical Writing", T. A. Rickard, Franklin Classics.
2. "Technical Writing", S. Jayprakash, Himalaya Publishing House Pvt. Ltd.
3. "Technical Writing", O. N. Pandey.