



**(An Autonomous College under VTU)**

**Department of Computer Science and Engineering**

**III to VIII Semesters**

**Scheme – 2019**

**Outcome-based Education and Choice-based Credit System**

## VISION

Create **globally competent professionals** through quality education in the field of Computer Science and Engineering.

## MISSION

- M1: Empowering** students by imparting knowledge, latest technologies through practical approach and academic professionalism to fulfil the needs of the industry.
- M2: Developing** Technical proficiencies, communication skills and teamwork among the students.
- M3: Inculcating** ethics, social behavior, and universal human values for sustainable societal growth and environmental protection.

## **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

**PEO1:** Apply the Computer Science and Engineering technical knowledge to fulfill the organizational needs.

**PEO2:** **Inculcate** proficiency, good communication skill, team building and problem-solving abilities.

**PEO3:** Pursue higher studies, research and to become entrepreneurs with good work ethics and professional behavior.

## **PROGRAM OUTCOMES (POs)**

Graduates of the Computer Science and Engineering Programme will be able to achieve the following POs:

### **PO1: Engineering Knowledge**

Apply the knowledge of mathematics, science, engineering fundamentals, and Computer Science and Engineering principles to the solution of complex problems in Computer Science and Engineering.

### **PO2: Problem Analysis**

Identify, formulate, research literature, and analyze complex Computer Science and Engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.

### **PO3: Design/Development of Solutions**

Design solutions for complex Computer Science and Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

### **PO4: Conduct investigations of Complex problems**

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions related to Computer Science and Engineering problems.

### **PO5: Modern Tool Usage**

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex Computer Science and Engineering activities with an understanding of the limitations.

### **PO6: The Engineer and Society**

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Computer Science and Engineering practice.

### **PO7: Environment and Sustainability**

Understand the impact of the professional Computer Science and Engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics**

Apply ethical principles and commit to professional ethics and responsibilities and norms of the Computer Science and Engineering practice.

**PO9: Individual and Teamwork**

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication**

Communicate effectively on complex Computer Science and Engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project Management and Finance**

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage Computer Science and Engineering projects and in multidisciplinary environments.

**PO12: Lifelong Learning**

Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAM SPECIFIC OUTCOMES (PSOs)****PSO1: Professional Skills:**

Ability to analyze, design and develop computer programs in the areas related to system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

**PSO2: Problem-Solving Skills:**

Ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

**PSO3: Foundation of mathematical concepts:**

Ability to apply mathematical concepts to solve real World problems using appropriate datastructure and suitable algorithms.

**Third Semester B.E. – Scheme 2019**

Sl. No.	Course Code	Course Name	Total Credits	L:T:P:S (Hrs/Week)	Online	Offline	Marks	Weeklyload
1	19MAT31	Fourier Series, Transforms and Numerical Techniques	4	3 : 2 : 0 : 0		100%	100	5
2	19CSI32	Data Structures using C (IC)	4	3 : 0 : 2 : 0		100%	100	5
3	19CSI33	Web Programming (IC)	3	3 : 0 : 2 : 0		100%	100	5
4	19CSI34	Python Programming (IC)	4	3 : 0 : 2 : 0		100%	100	5
5	19CST35	Analog and Digital Electronics	3	2 : 2 : 0 : 0		100%	100	4
6	19CST36	Computer Organization & Architecture	3	2 : 2 : 0 : 0		100%	100	4
7	19CPH37	Constitution of India, Professional Ethics and Human Rights	1	1 : 0 : 0 : 0		100%	100	1
8	19KAK38/ 19KVK38	Adalitha Kannada/ Vyavaharika Kannada	1	1 : 0 : 0 : 0		100%	100	1
9	19CSH39	Elements of Communication	2	1 : 0 : 2 : 0		100%	100	3
<b>Total</b>			<b>25</b>	<b>18: 6: 8: 0</b>			<b>900</b>	<b>33</b>

**Note: Internship has to be completed compulsorily before VIII Semester**

**Fourth Semester B.E. – Scheme 2019**

Sl. No.	Course Code	Course Name	Total Credits	L:T:P:S (Hrs/Week)	Online	Offline	Marks	Weekly load
1	19MAT41	Applied Calculus and Probability Distribution	4	3 : 2 : 0 : 0		100%	100	5
2	19CSI42	Design and Analysis of Algorithms (IC)	4	3 : 0 : 2 : 0		100%	100	5
3	19CSI43	Object Oriented Prog. With Java (IC)	4	3 : 0 : 2 : 0		100%	100	5
4	19CSI44	Database Concepts through My SQL(IC)	4	3 : 0 : 2 : 0		100%	100	5
5	19CST45	Operating Systems	3	2 : 2 : 0 : 0		100%	100	4
6	19CST46	Introduction to Microprocessors & Microcontrollers	3	2 : 2 : 0 : 0		100%	100	4
7	19UHV47	Universal Human Values	2	2 : 1 : 0 : 0		100%	100	3
8	19PDE49	Professional Development of Engineers	2	1 : 0 : 2 : 0		100%	100	3
<b>Total</b>			<b>26</b>	<b>19: 7 : 8 : 0</b>			<b>800</b>	<b>31</b>

**Note: Internship has to be completed compulsorily before VIII Semester**

**Fifth Semester B.E. – Scheme 2019**

Sl. No.	Course Code	Course Name	Total Credits	L:T:P:S (Hrs/Week)	Online	Offline	Marks	Weeklyload
1	19CST51	Software Engineering	3	3 : 0 : 0 : 0		100%	100	3
2	19CSI52	Advanced JAVA	4	3 : 0 : 2 : 0		100%	100	5
3	19CSI53	Computer Networks	4	3 : 0 : 2 : 0		100%	100	5
4	19CSI54	Data Warehousing and Data Mining	4	3 : 0 : 2 : 0		100%	100	5
5	19CST55X	Professional Elective – I	3	3 : 0 : 0 : 0		100%	100	3
6	19CSH56	Accountancy and Taxation	3	3 : 0 : 0 : 0		100%	100	3
7	19CSP57	Mini Project	2	0 : 0 : 0 : 8		100%	100	8
8	19PES59	Employability Skills and Aptitude Development	2	1 : 0 : 2 : 0		100%	100	3
			<b>25</b>	<b>19 : 0 : 8 : 8</b>			<b>800</b>	<b>35</b>
<b>Note: Internship has to be completed compulsorily before VIII Semester</b>								

**Professional Elective – I**

Course Code	Course Name
19CST551	Artificial Intelligence
19CST552	Image Processing
19CST553	Soft Computing

**Sixth Semester B.E. – Scheme 2019**

Sl. No.	Course Code	Course Name	Total Credits	L:T:P:S (Hrs/Week)	Online	Offline	Marks	Weekly load
1	19CSI61	Cloud Computing	4	3 : 0 : 2 : 0		100%	100	5
2	19CSI62	Android Application Development	4	3 : 0 : 2 : 0		100%	100	5
3	19CST63	Big Data Analytics	3	3 : 0 : 0 : 0		100%	100	3
4	19CSI64	Full Stack Development	4	3 : 0 : 2 : 0		100%	100	5
5	19CST65X	Professional Elective – II	3	3 : 0 : 0 : 0		100%	100	3
6	19CST66X	Professional Elective – III	3	3 : 0 : 0 : 0		100%	100	3
7	19ENV67	Environmental Science	1	1 : 0 : 0 : 0		100%	100	1
8	19PET691	Employability Skills and Technical Aptitude	2	1 : 0 : 2 : 0		100%	100	3
<b>Total</b>			<b>24</b>	<b>20 : 0 : 8 : 0</b>			<b>800</b>	<b>28</b>
<b>Note: Internship has to be completed compulsorily before VIII Semester</b>								

**Professional Elective – II**

Course Code	Course Name
19CST651	Cyber Security and Forensic
19CST652	Information & Network Security
19CST653	Block Chain & Crypto Currencies

**Professional Elective – III**

Course Code	Course Name
19CST661	Animation & Game Development
19CST662	Devops
19CST663	Machine Learning

**Seventh Semester B.E. – Scheme 2019**

Sl. No.	CourseCode	Course Name	Total Credits	L: T:P:S (Hrs/Week)	Online	Offline	Marks	Weeklyload
1	19CSI71	Advanced Cloud Computing (AWS)	4	3 : 0 : 2 : 0		100%	100	5
2	19CSI72	UML& AGILE PRACTICES	4	3 : 0 : 2 : 0		100%	100	3
3	19CST73X	Professional Elective-I	3	3 : 0 : 0 : 0		100%	100	5
4	19CST74X	Industrial Elective-I	3	3 : 0 : 0 : 0		100%	100	3
5	19CST75X	Industrial Elective-II	3	3 : 0 : 0 : 0		100%	100	3
6	19CST76	Online Certification	1	0 : 0 : 0 : 4		100%	100	4
7	19CSP77	Project Phase – I	2	0 : 0 : 4 : 0		100%	100	4
<b>Total</b>			<b>20</b>	<b>15: 0: 8: 4</b>			700	27
<b>Note: Internship has to be completed compulsorily before VIII Semester</b>								

**Professional Elective-I**

CourseCode	Course Name
19CST731	Robotics
19CST732	Adhoc Networks
19CST733	Pattern Recognition and Anomaly Detection

**Industry Elective-I**

CourseCode	Course Name
19CST741	Decision Support Systems (DSS)
19CST742	Enterprise Resource Planning (ERP)
19CST743	Supply Chain Management

**Industry Elective-II**

CourseCode	Course Name
19CST751	Digital Marketing
19CST752	Operations Research
19CST753	Management Entrepreneurship

**Eighth Semester B.E. – Scheme 2019**

Sl. No.	Course Code	Course Name	Total Credits	L : T : P : S (Hrs/Week)	Online	Offline	Marks	Weekly load
1	19CSP81	Technical Seminar	1	0 : 0 : 0 : 4	50	50	100	4
2	19CSP82	Internship Project	3	0 : 0 : 4 : 4	50	50	100	8
3	19CSP83	Project Phase, Evaluation and Viva voce(External)	11	0 : 0 : 18 : 8	100	100	200	26
<b>Total</b>			<b>15</b>	<b>0 : 0 : 22 : 16</b>	<b>200</b>	<b>200</b>	<b>400</b>	<b>38</b>

**Note: AICTE Activity points (Mandatory)**

# **III Semester Course Syllabus**

## FOURIER SERIES, TRANSFORMS AND NUMERICAL TECHNIQUES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19MAT31	3 : 2 : 0 : 0	04	CIE:50 SEE:50	3 Hours	BS

### Course Objectives:

This course will enable students to:

- Have the efficiency in expressing a periodic function in terms of infinite trigonometric series.
- Obtain the knowledge of Laplace Transforms.
- Acquire the skill in solving the engineering applications problem using Laplace Transforms.
- Get the ability to solve the engineering problem using Fourier Transforms.
- Develop the proficiency in solving algebraic and transcendental equations and interpolation using numerical methods.

### Module – I

**Fourier Series:** Periodic functions, Dirichlet's conditions, Euler's Formulae (without proof), Fourier series of periodic functions of period  $2l$  and  $2\pi$ , Half range Fourier series, Practical harmonic analysis problems.

**08 Hours**

### Module – II

**Laplace Transform:** Definition, Laplace Transform of elementary functions. Properties transform of derivatives, multiplication by  $tn$  and division by  $t$  - Problems. Laplace transforms of periodic functions, unit step functions and unit impulse function-Problems.

**08 Hours**

### Module – III

**Inverse Laplace Transforms:** Inverse Laplace Transforms of standard functions. (Formulae only). Inverse Laplace transform by using completing the squares, partial fractions, shifting property and differentiation - problems. Convolution theorem - problems. Applications - solution of linear differential equations with initial conditions-problems.

**08 Hours**

### Module – IV

**Fourier Transforms and Z - Transforms:** Complex Fourier transforms, Fourier Sine and Cosine transforms and their inverse transforms problems. Z-Transforms of some standard functions, Damping and shifting rules - problems. Inverse Z –Transforms by partial fraction method.

**08 Hours**

### Module – V

**Numerical Methods:** Numerical solutions of algebraic and transcendental equations-RegulaFalsi Method and Newton Raphson Method (Formulae only) Problems. Finite Differences-Forward and Backward differences, Newton's Forward and Newton's Backward interpolation formulae. Lagrange's Interpolation

formula (without proof) Problems. Numerical Differentiation using Newton's forward and Backward interpolation formulae. –Problems.

**07 Hours**

### **Course Outcomes:**

On completion of this course, the students are able to:

- CO1:** Demonstrate Fourier series to study the behaviour of periodic functions and their applications in engineering problem.
- CO2:** Find the Laplace transform of different types of functions.
- CO3:** Use the Laplace transform and inverse Laplace Transform in solving various types engineering application problems.
- CO4:** Make use of Fourier transform and Z-transform to illustrate and create/continuous function arising in Engineering applications.
- CO5:** Determine the roots of Algebraic and Transcendental equations and Interpolation arising in engineering applications, using numerical methods

### **Textbooks:**

- 1) Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters 10, 21, 22, 28, 29, 30), Khanna Publishers, New Delhi, 42nd Edition, 2012, ISBN:9788174091955.
- 2) N.P. Bali and Dr. Manish Goyal: "A Text Book of Engineering Mathematics", (Chapters 10, 18, 20, 22, 24), Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2014, ISBN:9788131808320.

### **Reference Books:**

- 1) Erwin Kreyszig: "Advanced Engineering Mathematics", Wiley Pvt. Ltd. India, New Delhi, 9<sup>th</sup> Edition, 2011, ISBN 13:9788126531356.
- 2) B.V. Ramana: "Higher Engineering Mathematics", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2<sup>nd</sup> Reprint, 2007, ISBN 13:978-0-07063417-0.

### **E-Resources:**

- 1) <http://bookboon.com/en/essential-engineering-mathematics-ebook>
- 2) <https://www.free-ebooks.net/ebook/essential-engineering-mathematics>
- 3) <https://archive.org/details/AdvancedEngineeringMathematics10thEdition>

## DATA STRUCTURES USING C(IC)

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI32	3:0:2:0	04	CIE:50SEE:50	03 Hours	IC

### Course Objectives:

This course will enable the students to:

- Understand the dynamic memory by pointers.
- Understand the difference between structure and self-referential structure
- Study linear data structures viz. stack, queue and linked list.
- Get knowledge on non-linear data structures viz. BST, AVL and B-Trees.
- Study and choose appropriate data structure to solve problems in real world

### Module –I

**Pointers:** Introduction, Accessing the variable and its address through the pointer, Declaring & initialization of pointer variables, Array of pointers, Pointer as function arguments, Functions returning pointers, Dynamic memory allocation - Introduction, malloc (), calloc(), realloc().

**08 Hours**

### Module –II

**Structures:** Introduction, defining a structure, declaring structure variables, accessing structure members, Structure initialization, Size of structures, Copying & comparing structure variables, Array of structures, Arrays within structures, Structures within structures. Self-referential structure.

**08 Hours**

### Module –III

**Linked Lists:** Introduction, Inserting and removing nodes from a list, Lists in C –Array implementation of lists, Circular lists, doubly linked lists: Inserting and removing nodes from a list.

**08 Hours**

### Module – IV

**Stack:** Definition, Stack operations: PUSH, POP, DISPLAY, Array implementation of stacks in C, Linked list implementation of stacks. **Queue:** Queue and its sequential representation, Queue operations: INSERTION, DELETION, DISPLAY, Array implementation of queues in C, Linked list implementation of queues.

**08 Hours**

### Module – V

**Trees:** Introduction, Binary search trees: Insertion and deletion of a node, searching a key element in Binary search tree, Binary tree traversals: preorder, inorder and postorder. Introduction to Balanced trees- AVL, B-Tree, Splay and Red-black.

**08 Hours**

**Lab Programs**

1. Design, develop and execute a program in C based on the following requirements: An EMPLOYEE structure is to contain the following members: Employee\_Number (an integer), Employee\_Name(a string of characters), Basic\_Salary(an integer), All\_Allowances(an integer), IT (an integer), Net\_Salary (an integer). Write a functions to read the data of an employee, to calculate Net\_Salary and to print the values of all the structure members. ( $\text{All\_Allowances} = 123\% \text{ of Basic\_Salary}$ ,  $\text{Income Tax (IT)} = 30\% \text{ of the gross salary}$  ( $\text{gross salary} = \text{Basic\_Salary} + \text{All\_Allowance}$ ),  $\text{Net\_Salary} = \text{Basic\_Salary} + \text{All\_Allowances} - \text{IT}$ ).
2. Design, develop and execute a program in C, to demonstrate Stack data structure using an array. Provide the following operations: a. Push b. Pop c. Display.
3. Design, develop and execute a program in C, to demonstrate Queue data structure using an array. Provide the following operations: a. Insert b. Delete c. Display.
4. Design, develop and execute a program in C to convert a given valid parenthesized infix arithmetic expression to postfix expression and then to print both the expressions. The expression consists of single character operands and the binary operators +, -, \* and /.
5. Design, develop and execute a program in C to evaluate a valid postfix expression using Stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands & binary arithmetic operators. The arithmetic operators are +, -, \* and /.
6. Design, develop and execute a program in C to implement LIST (linked list) with functions to insert an element at the front of the list as well as to delete an element from the front of the list (FIFO), display the contents of the list.
7. Design, develop and execute a program in C to implement LIST (linked list) with functions to insert an element at the front of the list as well as to delete an element from the rear of the list or vice versa (LIFO), display the contents of the list.
8. Design, develop and execute a program in C to implement LIST (linked list) with functions to insert an element at the front/rear end of the list and search & delete a key element of the list, if exists & display the contents of the list.
9. Write a C program to support the following operations on a doubly linked list where each node consists of integers
  - a. Create a doubly linked list by adding each node at the front.
  - b. Insert a new node to the left of the node whose key value is read as an input.
  - c. Delete the node of a given data, if it is found, otherwise display appropriate message.
  - d. Display the contents of the list.
10. Design, develop and execute a program in C to implement BST that represents a Binary Search Tree, with functions to perform inorder, preorder and postorder traversals & demonstrate the traversals. 1. AVL 2. B-Tree

**Course Outcomes:**

On completion of this course, the students will be able to:

**CO1:** Choose pointers for effective programming.

**CO2:** Analyse the use of structures over arrays in solving the real-world problems.

**CO3:** Use the appropriate data structure in context of solution of given problem.

**CO4:** Perform operations like insertion and deletion on different types of data structures like stack and queues.

**CO5:** Design and analyse programming problem statements using appropriate data structures like trees.

**Textbooks:**

- 1) Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed: "Fundamentals of Data Structures in C",
- 2) (Chapters 1-6,9,10), Universities Press-India, 2nd Edition, 2008, ISBN-13:978-8173716058.
- 3) Brian W Kernighan and Dennis M Ritchie: "The C Programming Language", (Chapters 1- 6,9,10), Prentice Hall, Englewood Cliffs, New Jersey, 2nd Edition, 1988, ISBN:0131103628.
- 4) Aaron M. Tenenbaum: "Data Structures using C", Pearson Education-India, 2nd Edition, 2003, ISBN-13: 978-8131702291.

**E-Resources:**

- 1) <https://www.cs.princeton.edu/>
- 2) <https://www.opendatastructures.org/ods-cpp>
- 3) <https://www.lib.mdp.ac.in/ebook/DSa>
- 4) <https://www.cs-fundamentals.com/data-structures/introduction-to-datastructures.php>
- 5) <https://www.cprogramming.com/algorithms-and-data-structures.html>
- 6) <https://online-learning.harvard.edu/course/data-structures-and-algorithms>

## WEB PROGRAMMING (IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI33	2 : 0 : 2 : 0	3	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to:

- Recollect the evolution of World Wide Web and its relevance to today's technological revolution and, to comprehend HTML, CSS scripts to design web layouts.
- Acquire Java Script skills for developing client-side web applications.
- Interpret the use of j-Query libraries to simplify complicated Java Script applications and also, to perform DOM manipulation using j-Query constructs.
- Cognize Bootstrap framework with a focus on creating interactive and responsive web pages faster and easier.
- Assimilate XML fundamentals for developing applications over web.

### Module - I

**HTML 5 and CSS:** Introduction to Hyper Text Markup Language, HTML Elements and Attributes, Headers, Colors, Formatting Elements, Links, Images, Tables, Divs, Lists, Forms, Frames, i-frames, HTML Media. **CSS:** Introduction to CSS, CSS selector, CSS formatting, positioning, layouts, debugging.

**08 Hours**

### Module – II

**JavaScript:** Introduction, Scripts and HTML Document, JS Output Statements, Variables, Data Types and Conversions, Operators, Expressions, Control Structure, Decisions and Loops, Functions, Document Object Model, Forms and Form Handling Elements, Scripting, Event Handling, Regular Expressions.

**08 Hours**

### Module-III

**JQuery:** Introduction, Selectors, Events, jQuery DOM Manipulation: jQuery HTML, jQuery CSS, jQuery Event Model, jQuery Effects and Animations, jQuery Plugins.

**08 Hours**

### Module - IV

**Bootstrap:** Bootstrap Scaffolding, Bootstrap CSS, Bootstrap Layout Components, Bootstrap JavaScript Plugins, Using Bootstrap.

**08Hours**

### Module – V

**XML:** Introduction, Syntax, Document Type Definitions, Namespaces, XML Schemas, Displaying Raw XML Documents, Displaying XML Documents with CSS.

**08 Hours**

## Lab Programs

### I. HTML and CSS

1. Write a HTML script to display employee details like name, address, mobile number, emailid etc similar to a telephone directory.
2. Write a HTML program to display a nested list to list down all the elements serviced by an event management company. The list should be a nested list with main events and sub events.
3. Write a HTML and CSS script to create a webpage with table structure containing alternative backgrounds using class selector functionalities.
4. Write a HTML and CSS program to design the cover page which displays the events taking place in and around the state.

### II. JavaScript

5. Write a HTML and java script program to implement a simple banking application. The application should provide features like withdraw, deposit, balance enquiry etc.
6. Write a HTML and java script program to create a registration page having fields name, username, email Id, password & re-enter password and apply validation using match & equal functions.

### III. jQuery

7. Write a HTML and jQuery program to create a webpage to fetch the details of the event and display the invitation.
8. Write a HTML and jQuery program to design a webpage to accept event organizer name from the user and display it on the webpage.

### IV. Bootstrap

9. Write a HTML and bootstrap program to display glyphs like envelope, print, search etc. Also, create buttons having glyphs as links to carry out specific tasks.

### V. XML

10. Write a XML program to store book details like title, author, publication year, price etc.

### Course Outcomes:

On completion of this course, the students will be able to:

**CO1:** Design attractive web layouts using HTML5 and style sheets in a presentable form.

**CO2:** Develop interactive UI for client-side web applications using JavaScript.

**CO3:** Integrate jQuery libraries to accelerate UI development for client-side web Applications.

**CO4:** Construct responsive web pages by integrating bootstrap framework.

**CO5:** Develop applications by using XML to use, store, transmit and display data over web.

**Textbooks:**

- 1) Robert W. Sebesta: "Programming the World Wide Web", Pearson, 4<sup>th</sup> Edition, 2012, ISBN: 978-81-317-6458-9.
- 2) Jon Duckett: "Web Design with HTML, CSS, JavaScript and jQuery Set", Wiley, 1<sup>st</sup> Edition, 2014, ISBN 13:978-1118907443.
- 3) SilvioMoreto, MattLambert, BenjaminJakobus,JasonMarah:"Bootstrap4-ResponsiveWeb Design", Packet Publishing, 2016, ISBN978-1-78839-731-5

**Reference Books:**

- 1) Jake Spurlock: "Bootstrap, Shroff", O ReillyMedia, UnitedStatesofAmerica, 1stEdition, 2013, ISBN:978 - 1-4493-4391-0.
- 2) Bear Bibeault, Yehuda Katz and Aurelio De Rosa: "jQuery in Action", Dream tech Press, New Delhi, India, 3rd Edition, 2015, ISBN:978-1617292071

**E-Resources:**

- 1) <http://www.w3schools.com/>
- 2) <https://www.javascript.com/learn/>
- 3) <https://learn.jquery.com>

## PYTHON PROGRAMMING (IC)

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI34	3: 0: 2 : 0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to

- Master the fundamentals of writing Python programming.
- Study the concepts of Strings and Lists in python.
- Understand the concept of core data structures.
- Acquire the knowledge of Object-Oriented Concepts in python.
- Learn the use of multi-threading and handling Files.

### Module – I

Why should you learn Python Programming, Introduction to Python, Python Interpreter and its working, Syntax and Semantics, Variables, Expressions and Statements, Conditional execution, Functions, User Input and Output.

**08 Hours**

### Module – II

Iteration, Strings, Arrays, Recursion, Introduction to Lists.

**08 Hours**

### Module – III

Lists, Dictionaries, Tuples, Modules, Regular Expressions.

**08 Hours**

### Module – III

Classes and objects, Classes and functions, Classes and methods, Types of methods, Inner class, Inheritance, Constructor, Method Overloading, Method Overriding.

**08 Hours**

### Module – V

Exception Handling, Multi-Threading, File handling.

**08 Hours**

### Lab Programs

1. Write a Python program to find GCD of two numbers.
2. Write a Python Program to find the square root of a number by Newton's Method.
3. Write a Python program to find the exponentiation of a number.
4. Write a Python Program to find the maximum from a list of numbers.
5. write a Python Program to perform Linear Search.
6. write a Python Program to perform Binary Search.

7. Write a Python Program to perform selection sort.
8. Write a Python Program to perform insertion sort.
9. Write a Python Program to perform Merge sort.
10. Write a Python program to find first n prime numbers.

**Course Outcomes:**

On completion of this course, the students will be able to

**CO1:** Apply Python syntax and semantics and be fluent in the use of Python flow control and functions.

**CO2:** Demonstrate proficiency in handling Strings and Lists.

**CO3:** Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

**CO4:** Interpret the concepts of Object-Oriented Programming as used in Python.

**CO5:** Develop exemplary applications using files in Python

**Textbooks:**

- 1) Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1<sup>st</sup> Edition, Create Space Independent Publishing Platform, 2016, ISBN 13: 9781530051120, (Chapters 1 – 13, 15).
- 2) Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2<sup>nd</sup> Edition, Green Tea Press, 2015, ISBN 13: 9781491939369, (Chapters 15, 16, 17).

**Reference Books:**

- 1) Charles Dierbach, "Introduction to Computer Science Using Python", 1<sup>st</sup> Edition, Wiley India Pvt Ltd, 2013. ISBN-13: 978-8126556014.
- 2) Mark Lutz, "Programming Python", 4<sup>th</sup> Edition, O Reilly Media, 2011. ISBN-13: 978-9350232873.
- 3) Wesley J Chun, "Core Python Applications Programming", 3<sup>rd</sup> Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
- 4) Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1<sup>st</sup> Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176.

**E-Resources:**

- 1) <https://www.youtube.com/watch?v=hEgO047GxaQ>
- 2) <https://www.tutorialspoint.com/python/index.htm>.

## ANALOG AND DIGITAL ELECTRONICS

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST35	2:2:0:0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

This course will enable the students to:

- Understand applications of diode as clippers, Limiters and clampers
- Learn the different types of amplifiers constructed from BJTs and MOSFETs.
- Acquire the knowledge about Boolean laws and theorems.
- Know the working of flip flops and Registers.
- Gain the knowledge of various counters.

### Module – I

**Diode Circuits:** The ideal diode, the second approximation, The third approximation, DC resistance of a diode, Load lines, Clippers and Limiters, Clampers.

**BJT Biasing:** Fixed Bias, Collector to base Bias, voltage divider bias, Operational Amplifier Application Circuits: Multi-vibrators using IC-555, Peak Detector, Schmitt trigger, Active Filters, Non-Linear Amplifier, Relaxation Oscillator.

**08 Hours**

### Module – II

Current-to-Voltage and Voltage-to-Current Converter, Regulated Power Supply Parameters, adjustable voltage regulator, D to A and A to D converter. **MOSFETs:** The Depletion-mode MOSFET, D-MOSFET curves, Depletion-mode MOSFET amplifiers, The enhancement-mode MOSFET, CMOS, E-MOSFET amplifiers

**08 Hours**

### Module – III

**Combinational Logic Circuits:** Boolean laws and theorems, Sum-of-Products method, Truth table to Karnaugh map, Pairs Quads, and Octets, Karnaugh simplifications, Don t-care conditions, Product-of-Sums method, Product-of-Sums simplifications, Simplification by Quine- McClusky method, Introduction to HDL, HDL implementation models. **Data-Processing Circuits:** Multiplexers, De-multiplexers, 1-of-16 Decoder, Encoders.

**08 Hours**

### Module – IV

**Flip-Flops:** Gated FLIP-FLOPs, Edge-triggered D FLIP-FLOP, Edge-triggered JK FLIP-FLOP, JK Master-slave FLIP-FLOP, Various representations of FLIP-FLOPs, HDL implementation of FLIP-FLOP **Registers:** Types of Registers, SerialIn-SerialOut, SerialIn-Parallelout, ParallelIn-SerialOut, Parallel In -Parallel Out.

**08 Hours**

### Module – V

**Registers:** Applications of shift registers, Register implementation in HDL.

**Counters:** Asynchronous counters, Decoding gates, Synchronous counters, changing the counter modulus, Decade counters, counter design as a synthesis problem.

**08 Hours**

#### Course Outcomes:

After studying this course, students will be able to

**CO1:** Use of diodes in clippers, limiters and clampers.

**CO2:** Design transistor and MOSFET amplifiers in different configurations

**CO3:** Apply K-Map and Quine- McClusky methods to simplify the given Boolean expressions.

**CO4:** Implement the registers using Flip-Flops.

**CO5:** Demonstrate the various counters

#### Textbooks:

- 1) Albert Malvino, David Bates: “Electronic Principles”, (Chapters 3,4,8,12,20), TMH, New Delhi, 8th Edition, 2015, ISBN-9780073373881.
- 2) Donald P Leach, Albert Paul Melvino and Goutam Saha: “Digital Principles and Applications”, (Chapters 3,4,8- 10), Tata McGraw Hill, New Delhi, India, 8th Edition, 2014, ISBN:9789339203402.

#### Reference Books:

- 1) RobertL. Boylestad, Louis Nashelsky: “Electronic Devices and Circuit Theory”, PHI/Pearson Education, New Delhi, 10th Edition, 2012, ISBN:9788131764596.
- 2) DavidA.Bell: “Electronic Devices and Circuits” ,Oxford University Press, New Delhi, India, 5th Edition, 2010, ISBN: 9780195693409.
- 3) M Morris Mano: “Digital Logic and Computer Design”, Pearson Education, Prentice Hall, 11th Edition, 2009, ISBN:9788177584097.

#### E-Resources:

- 1) [https://www.talkingelectronics.com/download/Malvino\\_electronic\\_principles.pdf](https://www.talkingelectronics.com/download/Malvino_electronic_principles.pdf).
- 2) <https://www.rtna.ac.th/departments/elect/data/EE304/Electronic%20Devices%20and%20Circuit%20Theory.pdf>
- 3) [https://www.abebook.com/Digital\\_Principles\\_Applications\\_Seventh\\_Edition\\_Albert/4893172428/bd](https://www.abebook.com/Digital_Principles_Applications_Seventh_Edition_Albert/4893172428/bd)

## COMPUTER ORGANIZATION & ARCHITECTURE

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST36	2:2:0:0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

This course will enable students to:

- Make students understand the basic structure and operation of digital computer.
- Expose the students with different ways of communicating with I/O devices and standard I/O interfaces.
- Learn the hierarchical memory system including cache memories and virtual memory.
- Acquire the knowledge of arithmetic, logic unit and implementation of fixed-point and floating-point arithmetic operations.
- Understand the two types of control unit techniques and the concept of pipelining.

### Module – I

**Basic Structure of Computers:** Basic Operational Concepts, Bus Structures, Performance–Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. **Machine Instructions and Programs:** Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions.

**08 Hours**

### Module – II

**Input/output Organization:** Accessing I/O Devices, Interrupts – Interrupt Hardware, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB.

**08 Hours**

### Module – III

**Memory System:** Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories–Mapping Functions, Replacement Algorithms, and Performance Considerations.

**08 Hours**

### Module – IV

**Arithmetic:** Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division.

**08 Hours**

**Module – V**

**Basic Processing Unit:** Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, and Micro programmed Control. **Pipelining:** Basic concepts of pipelining.

**08 Hours**

**Course Outcomes:**

On completion of this course, the students will be able to:

**CO1:** Explain the basic organization of a computer system.

**CO2:** Demonstrate the functioning of different sub systems such as processor, Input/output.

**CO3:** Evaluate performance of memory systems.

**CO4:** Design and analyze simple arithmetic and logical units.

**CO5:** Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.

**Textbooks:**

- 1) Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2011. ISBN: 9781259005275 (Listed topics only from Chapters 1, 2, 4, 5, 6, 7, 8, 9 and 12).
- 2) William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015. ISBN-13:9780132936330

**Reference Books:**

- 1) Hennessey and Patterson: “Computer Architecture A Quantitative Approach”, 5<sup>th</sup> Edition, Elsevier, 2017. ISBN: 9780128119051.

**E-Resources:**

- 1) <https://books.google.co.in/books?isbn=0071089004>
- 2) <https://books.google.co.in/books?isbn=8177589938>
- 3) <https://books.google.co.in/books?isbn=0124078869>

## CONSTITUTION OF INDIA, PROFESSIONAL ETHICS & HUMAN RIGHTS

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CPH37	1:0:0:0	01	CIE:50 SEE:50	02 Hours	S&H

### Course Objective:

This course will enable students to:

- Learn about the preamble the Indian constitution.
- Fundamental rights & duties of a citizen.
- Special privileges of society and economically weaker section of the society.
- Individual role & ethical responsibility towards society.

### Module-I

**Introduction to constitution:** Introduction, making of constitution, Salient features of the constitution, preamble of the Indian constitution. Fundamental rights & limitations.

**03 Hours**

### Module-II

**DPSP, Union Executives:** Directive principles of state policy, Fundamental duties, union executives-President, Prime minister, Parliament, supreme court of India.

**03 Hours**

### Module-III

**State executives, Electoral process, Amendments:** State executives- Governor, CM, state legislature, High courts, Electoral process. Amendment Procedures, Amendments- 42<sup>nd</sup>, 44<sup>th</sup>, 74<sup>th</sup>, 76<sup>th</sup>, 86<sup>th</sup> and 91<sup>st</sup>.

**02 Hours**

### Module-IV

**Special provisions, Municipalities, co-operative society:** Provisions for SC & ST, Women, Children & backward classes. Emergency provisions, Human rights. Municipalities, Panchayats and Co- operative societies.

**03 Hours**

### Module-V

**Scope & aim of Engineering ethics:** Ethics, Responsibility of engineers, impediments to responsibility, Risks, Safety and Liability of engineers, Honesty, Integrity and reliability in engineering.

**02 Hours**

**Course Outcomes:**

On completion of this course, students will be able to:

**CO1:** Familiarize with fundamental rights and duties.

**CO2:** Recognize the electoral process.

**CO3:** Get exposed to legislature and judiciary.

**CO4:** Realize special provisions given for women, children and weaker section of the society.

**CO5:** Exhibit engineering ethics and responsibilities of engineers.

**Textbook:**

1. D. Srinivasan, "Constitution of India, professional ethics", Himalaya Publishing House, 2006, 1st Edition.
2. Dr. Umapati K L, Ramesh L. Chakrasali, "Constitution of India, professional ethics", elite publishers, 2006, 2ndEdition.

**Reference Books:**

1. M. Raja Ram, Constitution of India, professional ethics. New Age International (P) Limited, Publishers, 2015, 3rd.Edition.

**VYAVAHARIKA KANNADA /ADALITHA KANNADA**

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19KVK38 / 19KAK38	1: 0 : 0 : 0	01	CIE:50 SEE:50	02 Hours	S&H

Subject Code: 19KVK38

CIE : 100 Marks

Credits : 01

1

**ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ**  
**ಕನ್ನಡೇತರರಿಗೆ ಕನ್ನಡ ಕಲಿಸಲು ಗೊತ್ತುಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ**  
**ವ್ಯಾವಹಾರಿಕ ಕನ್ನಡ - Vyavaharika kannada (Kannada for Usage)**

(Common to B.Arch, B.Plan and B.E/B.Tech of all branches)

[As per Outcome Based Education (OBE) and Choice Based Credit System (CBCS) scheme]

**Course Learning Objectives:**

The course will enable the non Kannadiga students to understand, speak, read and write Kannada language and communicate (converse) in Kannada language in their daily life with kannada speakers.

**Table of Contents**

Introduction to the Book,  
 Necessity of learning a local language:  
 Tips to learn the language with easy methods.  
 Easy learning of a Kannada Language: A few tips  
 Hints for correct and polite conversation  
 Instructions to Teachers for Listening and Speaking Activities  
 Key to Transcription  
 Instructions to Teachers

**Part – I Lessons to teach and Learn Kannada Language**

- |                   |   |
|-------------------|---|
| <b>Lesson – 1</b> | ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವಸಾಮ್ಯಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words              |
| <b>Lesson – 2</b> | ಸಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ಸಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns |
| <b>Lesson – 3</b> | ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals                               |
| <b>Lesson – 4</b> | ಊರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು - ಸಪ್ರದಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case                         |
| <b>Lesson – 5</b> | ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು - Dative Cases, and Numerals  |
| <b>Lesson – 6</b> | ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ಸಾಮರೂಪಗಳು - Ordinal numerals and Plural markers   |
| <b>Lesson – 7</b> | ಕುಳ್ಳು / ನಿರೋಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು Defective / Negative Verbs and Colour Adjectives                                      |
| <b>Lesson – 8</b> | ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಆರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು - Permission, Commands, encouraging                         |

ಬಳಕೆ ಕನ್ನಡ

	and Urging words (Imperative words and sentences)
Lesson – 9	ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಯಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication
Lesson – 10	“ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs
Lesson – 11	ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ Comparative, Relationship, Identification and Negation Words
Lesson – 12	ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು Different types of forms of Tense, Time and Verbs
Lesson – 13	ದ್, -ತ್, -ತು, -ಇತು, -ಆಗಿ, -ಅಲ್ಲ, -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ Formation of Past, Future and Present Tense Sentences with Verb Forms
Lesson – 14	ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮತ್ತು ರಾಜ್ಯದ ಬಗ್ಗೆ ಕುರಿತಾದ ಇತರೆ ಮಾಹಿತಿಗಳು Karnataka State and General Information about the State
Lesson – 15	ಕನ್ನಡ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯ - Kannada Language and Literature
Lesson – 16	ಭಾಷೆ ಕಲಿಯಲು ಏನನ್ನು ಮಾಡಬೇಕು ಮತ್ತು ಮಾಡಬಾರದು Do's and Don'ts in Learning a Language
Lesson – 17	PART - II Kannada Language Script Part – 1
Lesson – 18	PART - III Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು - Kannada Words in Conversation

ಲೇಖಕರು

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಸಹಾಯಕ ಪ್ರಾಧ್ಯಾಪಕರು ಮತ್ತು ಮುಖ್ಯಸ್ಥರು  
ಮಾನವಿಕ ಮತ್ತು ಸಾಮಾಜಿಕ ವಿಜ್ಞಾನಗಳ ವಿಭಾಗ  
ಸರ್ಕಾರಿ ಇಂಜಿನಿಯರಿಂಗ್ ಕಾಲೇಜು - ಹಾಸನ

ಪ್ರಕಟಣೆ

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

2020



ಬಳಕೆ ಕನ್ನಡ

Subject Code : 19KAK38  
CIE : 100 Marks  
Credits : 01

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ / 1

## ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ ಆಡಳಿತ ಕನ್ನಡ

(ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ)

(ಕನ್ನಡಿಗರಿಗಾಗಿ - for Kannadigas - Common to all branches)

[As per Outcome Based Education (OBE) and Choice Based Credit System (CBCS) scheme]

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡದ ಜೊತೆಗೆ ಕ್ರಿಯಾತ್ಮಕ ಕನ್ನಡವನ್ನು, ಕನ್ನಡ ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಸುರಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ಕನ್ನಡದಲ್ಲಿ ತಾಂತ್ರಿಕ ವಿದ್ಯಾರ್ಥಿಗಳ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಹಲವಾರು ವಿಷಯಗಳನ್ನು ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಪರಿವಿಡಿ

ಭಾಗ - ಒಂದು ಲೇಖನಗಳು

ಕನ್ನಡ ಸಾಹಿತ್ಯ, ಸುರಿಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳು

೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ : ಹಂಪಿ ಭಾರತೀಯ
೨. ಕರ್ನಾಟಕದ ವಿಕೀಕರಣ : ಒಂದು ಅಭಿಮಾನ ಚರಿತ್ರೆ - ಬಿ. ವೆಂಕಟಗುಟ್ಟಯ್ಯ
೩. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ನಿಮ್ಮಿಡ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೀಶವರಮೂರ್ತಿ •

ಭಾಗ - ಎರಡು

ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ)

೪. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಬ್ಬಮಹದೇವಿ, ಅಯ್ಯಕ್ಕಿ, ಮಾರಯ್ಯ, ಪೆಂಡರ ದಾಸಿಮಯ್ಯ, ಅಯ್ಯಕ್ಕಿ, ಅಕ್ಕಮಯ್ಯ.
೫. ಕೀರ್ತನೆಗಳು : ಅದರಿದೇವರು ಭಲ ಅದರಿದೇವರು ಭಲ - ಪುರಂದರದಾಸ ತಲ್ಲಣಿಸಿದರು ಕಂಠ್ಯ ತಾಳು ಮನವೆ - ಕನಕದಾಸ
೬. ತತ್ವಪದಗಳು : ಸಾಮರ ಕೊಡಗಳ ಗುಟ್ಟು - ಶಿಶುನಾಥ ಪರೀಥ ಶಿವಯೋಗಿ - ಬಾಲಲೀಲಾ ಮಹಾಂತ ಶಿವಯೋಗಿ
೭. ಜನಪದ ಗೀತೆ : ದೀನುಪ ಪದ, ಬಡವರಿಗೆ ಸಾಪ ಕೊಡಬೇಡ

ಭಾಗ - ಮೂರು

ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ)

೮. ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ : ಡಿ.ವಿ.ಬಿ.

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ / 2

೯. ಕುರುಡು ಕಾಂಚಾಣಾ : ದ.ರಾ. ಬೇಂದ್ರೆ  
 ೧೦. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು  
 ೧೧. ಹೆಂಡತಿಯ ಕಾಗದ : ಕೆ.ಎಸ್. ನರಸಿಂಹಸ್ವಾಮಿ  
 ೧೨. ಮುಬ್ಬಿನಿಂದ ಮುಬ್ಬಿಗೆ : ಬಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ  
 ೧೩. ಆ ಮರ ಈ ಮರ : ಚಂದ್ರಶೇಖರ ಕಂಬಾರ  
 ೧೪. ಬೋಮನ ಮಕ್ಕಳ ಹಾಡು : ಸಿದ್ಧಲಿಂಗಯ್ಯ

ಭಾಗ - ನಾಲ್ಕು

ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿ ಪರಿಚಯ, ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

೧೫. ಡಾ. ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ : ಎ ಎನ್ ಮೂರ್ತಿರಾವ್  
 ೧೬. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ  
 ೧೭. ಮೆಗಾಸೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

ಭಾಗ - ಐದು

ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ

೧೮. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ  
 ೧೯. 'ಕ' ಮತ್ತು 'ಬ' ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕನ್ನಡದ ಟೈಪಿಂಗ್\*  
 ೨೦. ಕನ್ನಡ - ಕಂಪ್ಯೂಟರ್ ಶಬ್ದಕೋಶ\*  
 ೨೧. ತಾಂತ್ರಿಕ ಪದಕೋಶ : ತಾಂತ್ರಿಕ ಹಾಗೂ ವಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು\*  
 \* (ಅಧ್ಯಾಯ 3, 19, 20 ಮತ್ತು 21 ಇವುಗಳು ವಿಶೇಷ ಯೋಜನೆಯಿಂದ ಪ್ರಕಟಿತ " ಆದೇಶ ಕನ್ನಡ " ಮತ್ತಿತರದಿಂದ ಆಯ್ದ ಲೇಖನಗಳು - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ.

ಸಂಪಾದಕರು

ಡಾ. ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ  
 ವಿಶ್ವಾಸ ಕುಲಪತಿಗಳು, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ.

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಸಹಾಯಕ ಪ್ರಾಧ್ಯಾಪಕರು ಮತ್ತು ಮುಖ್ಯಸ್ಥರು,  
 ಮಾನವಿಕ ಮತ್ತು ಸಾಮಾಜಿಕ ವಿಜ್ಞಾನಗಳ ವಿಭಾಗ,  
 ಸರ್ಕಾರಿ ಇಂಜಿನಿಯರಿಂಗ್ ಕಾಲೇಜು, ಹಾಸನ.

ಪ್ರಕಟಣೆ

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

2020



## ELEMENTS OF COMMUNICATION

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CSH39	1 : 0 : 2 : 0	02	CIE:50 SEE:50	03 Hours	PT

### Course Objectives:

This course will enable students to:

- Implement English vocabulary at command and ensure language proficiency.
- Pronunciation skills to enhance with English vocabulary and language proficiency Language Lab.
- Augment LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred
- Achieve better technical writing and Presentation skills Identify the common errors in speaking and writing English and acquire Employment and Workplace communication skills.
- Define non-verbal communication

### Module – I

**Introduction to Communication Skills:** What is communication? The importance of communication skills in Engineering, Key concepts in communication, Kinds of communication, The communication process, Barriers & filters in communication, Feedback in communication, Traits of a good and poor communicator, The communication pie

**04 Hours**

### Module – II

**Listening Skills**– Its importance, Difference between hearing & listening, Active Listening, Traits of good listeners, The Listening Cycle, Listening for Pronunciation Practice.

**Speaking skills:** Importance of Speaking, Purpose of Speaking, Secrets to Speaking, Importance of Pronunciation in speaking, Improving pronunciation through cluster ,Sounds, Pronunciation clarity & Cluster sounds, JAM Sessions, Pick and Speak.

**06 Hours**

### Module – III

**Reading Skills:** Importance of Reading Skills in Communication, Building confidence in reading, Countering common errors in reading, Reading rate & reading comprehension, Jigsaw reading.

**Writing skills:** Importance of Written Communication, The importance of good sentence and paragraph construction, Hallmarks of good writing, Accuracy, Ambiguity & Brevity in written communication, 7 C's of written communication, Activities on Written Communication.

Email etiquette: Before you start typing: what to send by Email, “What I’m trying to say”: creating an accurate subject line. It’s still business writing: 12 common errors to avoid, Before clicking ‘send’: checking, proofing and copying, Damage control: Rx for bad email moments.

**06 Hours**

#### **Module – IV**

Body Language: Importance of Body Language, Body Language Do’s & Don’ts, Body Language speaks volumes – the fine print, Body Language behavior & their Interpretation.

Presentation Skills: How to be an effective presenter, Establishing specific purpose and desired outcomes of a presentation, Organizing, writing and editing content in a presentation, Preparation of effective visuals to guide and support a presentation, Effective use of verbal and non-verbal presentation techniques.

Group presentations: Group presentations by the participants, Presentations would be followed by question & answer sessions, Extensive feedback would be given by the trainer on the strengths & areas of improvement, Action plan for improvement for each individual student.

**06 Hours**

#### **Module – V**

Team Building: Defining team and its important elements, Clarifying the advantages and challenges of team work, Understanding bargains in team building, Defining behavior to sync with team work, Team building activities.

**04 Hours**

#### **Course Outcomes:**

On completion of this course, students should be able to:

**CO1:** Identify common errors in spoken and written communication and get familiarized with English vocabulary and language proficiency. Improve nature and style of sensible writing and acquire employment and workplace communication skills.

**CO2:** Improve their Technical Communication Skills through Technical Reading and Writing practices.

**CO3:** Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciation and Implement English vocabulary at command and language proficiency.

**CO4:** Understand and improve the nonverbal communication and kinesics. Perform well in campus recruitment, engineering and all other general competitive examinations.

**CO5:** able to communicate effectively orally and in writing.

#### **Text Books:**

1. S.L.N. Sharma, K. Shankaranarayana: “Basic Grammar”, NavakarnatakaVinyasa Pvt. Limited.
2. Technical Communication by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.

3. Communication Skills by Sanjay Kumar and PushpLata, Oxford University Press - 2018. Refer it's workbook for activities and exercises — “Communication Skills — If (A Workbook)” published by Oxford University Press—2018.

**Reference Books:**

1. Technical Communication - Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
2. English Language Communication Skills (Lab Manual cum Workbook), Cengage learning India Pvt Limited [Latest Revised Edition]—2018. Reference Books.
3. English for Technical Communication by N.P.Sudharshana and C.Savitha, Cambridge University Press—2016.
4. Intermediate Grammar, Usage and Composition by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan-2016.

**E-Resources:**

1. <https://www.habitsforwellbeing.com/9-effective-communication-skills/>
2. <https://www.selfgrowth.com/events/5-elements-of-effective-communication-2>

# **IV Semester Course Syllabus**

## APPLIED CALCULUS AND PROBABILITY DISTRIBUTIONS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19MAT41	3:2:0:0	04	CIE:50 SEE:50	03 Hours	BS

### Course Objectives:

This course will enable students to:

- Acquire the knowledge of calculus of complex functions.
- Develop the proficiency in solving Numerical integral and Initial value problems.
- Obtain the knowledge of probability distributions.
- Learn concept of the Joint distributions and Markov's chains. Known the importance of statistical inference in engineering.

### Module – I

**Complex Variables:** Functions of a complex variable, derivative of complex functions. Analytic functions, (No problems by using limits). Cauchy's-Riemann equations in Cartesian and polar forms, Harmonic functions—problems (No problems by using limits). Construction of analytic functions by using Milne-Thomson method—problems.

**Complex integration:** Line integrals -problems. Cauchy Theorem (no problems on verification of the theorem) and Cauchy's integral formula -problems.

**08 Hours**

### Module – II

**Numerical Methods:** Numerical Integration-Trapezoidal rule, Simpson's 1/3rd and 3/8th rule. Numerical solutions of ordinary differential equations of first order and first degree-Picard's method, Taylor's Series method, Modified Euler's Method, Runge-Kutta Method of 4th order and Milne's Predictor Corrector Method (without proof)—Problems.

**08 Hours**

### Module – III

**Random Variables and Probability Distribution:** Discrete and continuous Random Variables, Probability density function and distributions. Binomial, Poisson, Exponential and Normal distributions.

**08 Hours**

### Module – IV

**Joint Probability and Markov's Chain:** Joint Probability distribution of two discrete random variables. Expectations, correlation and covariation. Probability vectors, stochastic matrices, fixed point matrices, regular stochastic matrices, Markov's Chains, higher transition probabilities, stationary distribution of regular Markov's Chains.

**08 Hours**

### Module – V

**Sampling and inference:** Sampling Distribution, Testing of hypothesis, level of significance, confidence

limits, test of significance of large samples, sampling of variables, central limit theorem, confidence limits for unknown means, Students t-distribution and Chi-square test.

**08 Hours**

### Course Outcomes:

On completion of this course, the students are able to:

- CO1:** Use the concepts of analytical functions and complex integration in engineering application problems.
- CO2:** Solve the Numerical integral and initial value problems arising in engineering applications, using numerical methods.
- CO3:** Apply probability distributions in analysing the probability models arising in engineering field.
- CO4:** Apply Joint probability distributions and Markov's chains in analyzing the probability models arising in engineering field.
- CO5:** Use the concept of sampling analysis in analysing the statistical models arising in engineering field

### Textbooks:

- 1) Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters 20, 26, 27, 30, 32), Khanna Publishers, New Delhi, 42nd Edition, 2012, ISBN: 9788174091955.
- 2) N.P. Bali and Dr. Manish Goyal: "A Text Book of Engineering Mathematics", (Chapters: 19, 21), Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2014, ISBN: 9788131808320.
- 3) Seymour Lipschitz and Marc Lars Lipson: "Probability", (Chapters: 5 and 8), McGraw Hill Education (India) Private Limited, Chennai, Special Indian Edition, 2010, ISBN: 978-0-07-014622-8.

### Reference Books:

- 1) Erwin Kreyszig: "Advanced Engineering Mathematics", Wiley Pvt. Ltd., India, New Delhi, 9th Edition, 2011, ISBN 13: 9788126531356.
- 2) B.V. Ramana: "Higher Engineering Mathematics", Tata McGraw – Hill Publishing Company Limited, New Delhi, 2nd Reprint, 2007, ISBN 13: 978-0-07063417-0.

### E-Resources:

- 1) <http://bookboon.com/en/essential-engineering-mathematics-ebook>
- 2) <https://www.free-ebooks.net/ebook/essential-engineering-mathematics>
- 3) <https://archive.org/details/AdvancedEngineeringMathematics10thEdition>
- 4) <http://www.zums.ac.ir/ebooks/mathematics/essential-engineering-mathematic>

## DESIGN AND ANALYSIS OF ALGORITHMS (IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI42	3 :0: 2 :0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable the students to:

- Assess how the choice of algorithm design methods impacts the performance of programs.
- Solve problems using Divide and Conquer methods and writing programs for these solutions.
- Solve problems using algorithm design methods such as the greedy method.
- Choose the appropriate algorithm design method to find the shortest path for a specified application.
- Solve problems using algorithm design methods such as the, pattern matching, backtracking.

### Module – I

**Introduction Algorithms:** Performance analysis, space and time complexity, Growth of function - big Oh, Omega, Theta notation, Mathematical background for algorithm analysis, Analysis of selection sort, insertion sort, Randomized algorithms, Recursive algorithms, The substitution method, Recursion tree method, Master method.

**08 Hours**

### Module – II

**Divide and Conquer:** General method, Binary search, finding minimum and maximum, Merge sort analysis, Quick sort analysis, Shassen's matrix multiplication, the problem of multiplying long integers.

**Decrease and conquer approaches:** Introduction, Insertion Sort, Depth First Search and Breadth First Search.

**08 Hours**

### Module – III

**Greedy Method:** General Method, Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees- Kruskal and prim's algorithm, Optimal storage on tapes, Single source shortest path.

**Transform and conquer:** Introduction, Balanced search trees, Heap and Heap sort

**08 Hours**

### Module – IV

**Dynamic Programming:** General Method, Multistage graphs, all pair shortest path, single source shortest path, 0/1 knapsack, Travelling salesman problem, Flow shop scheduling.

**08 Hours**

### Module – V

**Backtracking:** General Method, 8 queen problem (N-queen problem), Sum of subsets, Graph coloring.

**String Matching Algorithms:** The naive string-matching Algorithms, The Rabin Karp algorithm, String matching with finite automata, the knuth-Morris-Pratt algorithm, longest common subsequence algorithm.

**08 Hours**

**Lab Programs**

1. Write a C/C++ program to sort the elements by using quick sort method.
2. Write a C/C++ program to sort the elements by using merge sort method.
3. Obtain the Topological ordering of vertices in a given digraph.
4. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
5. Implement 0/1 Knapsack problem using Dynamic Programming.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
7. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
8. a. Compute the transitive closure of a given directed graph using Warshall's algorithm.  
b. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.
9. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.  
b. Check whether a given graph is connected or not using DFS method.
10. Implement N Queen's problem using Back Tracking.

**Course Outcomes:**

On completion of this course, the students will be able to:

- CO1:** Understand the concept of pseudo code for writing an algorithm and acquire ability to analyze the asymptotic performance of various algorithms
- CO2:** Explore the concept of divide and conquer and graphs and get familiarity of analysis of various graph algorithms.
- CO3:** Understand algorithm designing techniques such as Greedy approach and explore to various related application problems.
- CO4:** Use different algorithms to solve dynamic programming problems.
- CO5:** Apply the pattern matching techniques in the real-world problems.

**Textbooks:**

- 1) Anany Levitin: "Introduction to The Design and Analysis of Algorithms", (Chapters 1- 5,7,9,11), Pearson Education, Delhi, 3rd Edition, 2012. ISBN-13: 978-0-13-231681-1 ISBN- 10: 0-13- 231681-1.
- 2) Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: "Fundamentals of Computer Algorithms", (Chapters 1,3-8,10-12), Universities Press, Hyderabad, 2nd Edition, 2007, ISBN: 10:8173716129.

**Reference Books:**

- 1) Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein: "Introduction to Algorithms", PHI, London, England, 3rd Edition, 2010, ISBN:9780262033848.
- 2) R.C.T. Lee, S.S. Tseng, R.C. Chang and Y.T. Tsai: "Introduction to the Design and Analysis of Algorithms - A Strategic Approach", McGraw-Hill Higher Education, USA, International Edition, 2005, ISBN-13: 978-0071243469.

**E-Resources:**

- 1) <http://www.pearsonhighered.com>
- 2) <http://www.citc.ui.ac.ir/zemoni/cls.pdf>
- 3) <http://cs.gmu.edu/~pwiegand/cs483-Spring06/lecturenotes/cs483-11pf.pdf>
- 4) <http://www.cs.cornell.edu/~kozen/papers/daa.pdf>

## OBJECT ORIENTED PROGRAMMING WITH JAVA(IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI43	3:0:2:0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to:

- Learn the basic concepts of object-oriented programming.
- Understand the basics of JAVA Programming using classes and objects.
- Gain the knowledge of Inheritance and packages.
- Expose to the concepts of exceptions that occur while programming in JAVA.
- Acquire the knowledge of multi-threaded programming in JAVA.

### Module – I

**Introduction to Object Oriented Concepts:** Procedure–Oriented Programming system, Object Oriented Programming System, Comparison of Object-Oriented Language with C.

**Introduction to Java:** Java's magic, The Byte code, Java Development Kit (JDK), Java Buzzwords, Object-oriented programming, IO Streams, Data types, variables and arrays, reference variables, Operators, Control Statements. Simple Java programs.

**08 Hours**

### Module – II

**Classes:** Classes fundamentals, Declaring objects, this keyword, garbage collection.

**Methods:** Method Prototyping, Member functions and data members, Constructors, Objects and methods, Method Overloading, Objects and arrays, Access modifiers, Setters and getters, Nested classes, Console I/O.

**08 Hours**

### Module – III

**Inheritance:** Inheritance basics, using super, creating multi-level hierarchy, method overriding, using Abstract classes, using final. **Packages:** Packages: Access Protection, Importing Packages.

**08 Hours**

### Module – IV

**Interfaces, Exceptions, Applets:** Interfaces, Exception handling fundamentals, exception types, uncaught exceptions, using try and catch, using multiple catch clauses, nested try statements, throw, throws, finally, Exception handling in Java, Applets, Types of Applets, Applet basics and class, Applet Architecture.

**08 Hours**

### Module – V

**Event Handling and Multi-Threaded Programming:** Two event handling mechanisms, the delegation event model, Event classes, Sources of events, Event listener interfaces, Using the delegation event model, Adapter classes, Inner classes. Multi-Threaded Programming: What are threads? How to make the classes thread able,

Extending threads, Implementing run able, Synchronization, Changing state of the thread, Bounded buffer problems, read-write problem.

**08 Hours**

### Lab Programs

1. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.
2. Write a Java program that prints the following pattern type
  - a. \*\*\*\*\*
  - b. \*\*\*\*\*
  - c. \*\*\*\*\*
  - d. \*\*\*\*\*
  - e. \*\*\*\*\*
  - f. \*\*\*\*\*
3. Write a java program to calculate gross salary & net salary taking the following data. Input: empno, empname, basic Process: DA=50% of basic HRA=25% of basic CCA=Rs240/-
4. PF=10% of basic PT=Rs100/-
5. Write a Java program that displays area of different Figures (Rectangle, Square, Triangle) using the method over loading.
6. Write a Java program that displays the time in different formats in the form of HH, MM, SS using constructor Overloading.
7. Write a Java program that counts the number of objects created by using static variable.
8. Write a java program that implements educational hierarchy using inheritance.
9. Write a java program that implements Array Index out of bound Exception using built-in-Exception.
10. Write a java program that implements bank transactions using user defined exception.
11. Write a java program to identify the significance of finally block in handling exception.

### Course Outcomes:

On completion of this course, the students will be able to:

- CO1:** Understanding the difference between Procedure and Object-Oriented Programming.
- CO2:** Develop basic JAVA programs.
- CO3:** Apply Inheritance properties and packages in solving real world problems.
- CO4:** Use exception handling methods efficiently.
- CO5:** Demonstrate the programs by using multithreaded concepts.

### Textbooks:

- 1) Herbert Schildt, "Java The Complete Reference", 7<sup>th</sup> Edition, Tata McGraw Hill, 2013, ISBN-13: 978-0072263855, (Chapters 1-11).

**Reference Books:**

- 1) Herbert Schildt, “The Complete Reference C++”, 4<sup>th</sup> Edition, Tata McGraw Hill, 2013, ISBN-13:978-0072226805.
- 2) E Balagurusamy, “Programming with Java-A primer”, 2<sup>nd</sup> Edition, Tata McGraw Hill companies, 2009, ISBN-13:978-9351343202.

**E-Resources:**

- 1) [www.geeksforgeeks.org/java/](http://www.geeksforgeeks.org/java/)
- 2) [www.tutorialspoint.com/java/index.html](http://www.tutorialspoint.com/java/index.html)

## DATABASE CONCEPTS THROUGH MYSQL (IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI44	3:0:2:0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to:

- Understand the basic concepts of database and Database Management System and difference between relational systems and non-relational systems.
- Gets a clear understanding of how to create and maintain data in a relational database using SQL.
- Understand the working of advanced queries in SQL.
- Understand how data can be manipulated using indexing.
- Gets a clear understanding of how to design and develop applications using JDBC and SQL.

### Module – I

**Introduction to Database:** Introduction, Characteristics of database approach, Advantages of using the DBMS approach. Database System concepts and architecture: Data Models, Schemas, and Instances, Three schema architecture and Data independence. Data Modeling using Entities and Relationships Model: Entity types, Entity sets, attributes and keys, relationship, constraints, ER diagrams.

**08 Hours**

### Module – II

**Relational Model:** Relational Model Concepts, Relational Model Constraints and relational database schemas. SQL: SQL data definition and data types, specifying constraints in SQL, schema change statements in SQL, INSERT, DELETE, and UPDATE statements in SQL, assertions, views, queries.

**08 Hours**

### Module – III

**More complex SQL retrieval queries:** Nested queries, correlated nested queries, The EXISTS and UNIQUE function in SQL, Joins, Aggregate functions in SQL, Grouping: Group by and having clauses.

**08 Hours**

### Module – IV

**Index Structure:** Index Structures, Indexes on Sequential Files-Secondary Indexes-B-Trees-Hash Tables-Bitmap Indexes.

**08 Hours**

### Module – V

**Project Work:** To design and implement current trends and new challenges of database applications using the concepts of database management systems with special emphasis on JDBC and MySQL database.

**08 Hours**

**Lab Programs**

Programs covering SQL, Constraints, Operators and Functions, Nested queries and Joins etc. Project Work.

**Course Outcomes:**

On completion of this course, the students will be able to:

- CO1:** Describe the basic concepts of database and Database Management System; enforce integrity constraints on a database using RDBMS.
- CO2:** Implement Structured Query Language (SQL) queries for database manipulation.
- CO3:** Create complex sql queries and use them for database manipulation.
- CO4:** Apply indexing structures for file handling.
- CO5:** Design data base systems for current trend applications to interact with databases using JDBC and database to save and retrieve data in a safe and consistent manner.

**Textbooks:**

- 1) Fundamentals of Database Systems; RamezElmasri and Shamkant B.Navathe;Pearson; 5<sup>th</sup>Edition; ISBN 978-81-317-1625-0.
- 2) Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill, ISBN-13: 978-0072465631, ISBN-10:0072465638
- 3) Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, “Database Systems:TheComplete Book”,Pearson Education, Second Edition, ISBN-13: 978-0131873254, ISBN-10:0131873253

**Reference Books:**

- 1) SilberschatzKorth and Sudharshan, Database System Concepts, 6th Edition, Mc- GrawHill, 2013, ISBN0-07-352332-1

**E-resources:**

- 1) <https://www.db-book.com/db6/>.
- 2) <https://www.pdfdrive.com/database-management-systems-3rd-editionpdf-e16674103.html>.[https://github.com/pforpallav/school/blob/master/CPSC404/Ramakrishnan](https://github.com/pforpallav/school/blob/master/CPSC404/Ramakrishnan%20Database%20Management%20Systems%203rd%20Edition.pdf)
- 3) %20Database%20Management%20Systems%203rd%20Edition.pdf

## OPERATING SYSTEMS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST45	2:2:0:0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

This course will enable students to:

- Learn the basic concepts of operating system, services and process handling.
- Impart adequate knowledge on the need of parallel programming using multi-threading concepts.
- Identify and handling deadlocks.
- Enable effective usage of the memory management techniques.
- Know about various file systems and understand the working of Linux platform.

### Module – I

**Introduction to Operating Systems, System Structures:** What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special- purpose systems; Computing environments.

**Operating System Services:** User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot.

**08 Hours**

### Module – II

**Process Management:** Process concept; Process scheduling; Operations on processes; Inter process communication.

**Multi-threaded Programming:** Overview; Multithreading models; Thread Libraries; Threading issues.

**Process Scheduling:** Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple- processor scheduling; thread scheduling.

**Process Synchronization:** Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.

**08 Hours**

### Module – III

**Deadlocks:** Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

**08 Hours**

### Module – IV

**Memory Management:** Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.

**Virtual Memory Management:** Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

**08 Hours**

### **Module – V**

**File System, Implementation of File System:** File system: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. **Case Study:** The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.

**08 Hours**

### **Course Outcomes:**

On completion of this course, the students will be able to:

- CO1:** Demonstrate functional architecture of an operating system.
- CO2:** Describe process scheduling, multithreading and synchronization Concepts.
- CO3:** Use suitable techniques for handling the deadlocks.
- CO4:** Apply various memory management techniques.
- CO5:** Realize the different concepts of OS in platform of usage through case studies

### **Textbooks:**

- 1) Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, “Operating System Concepts” 9th edition, Wiley-India, 2016. ISBN-13: 978-8126554270.

### **Reference Books:**

- 1) Andrew S. Tanenbaum, Herbert Bos, "Modern Operating Systems", 4th edition, Pearson, India, 2014. ISBN-13: 978-0133591620.
- 2) D.M Dhamdhere, “Operating Systems: A Concept Based Approach “, 3rd Ed, McGraw-Hill, 2013. ISBN: 9781259005589.

### **E-Resources:**

- 1) [https://www.tutorialspoint.com/operating\\_system/index.htm](https://www.tutorialspoint.com/operating_system/index.htm).
- 2) <https://www.studytonight.com/operating-system/>.

## INTRODUCTION TO MICROPROCESSORS & MICROCONTROLLERS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST46	2:2:0:0	03	CIE:100 SEE:100	03 Hours	PCC

### Course Objectives:

This course will enable students to:

- Understand differences between Microprocessors and Microcontrollers.
- Analyze the properties of Microprocessors and Microcontrollers
- Apply the knowledge of data transfer information through serial and parallel ports.
- Create real world applications using assembly language.
- Analyze their practical knowledge through experiments

### Module-I

**Introduction to Microprocessor:** The x86 microprocessor: Brief history of the x86 family, Inside the 8088/86, Introduction to assembly programming, Introduction to Program Segments, The Stack, Flag register, x86 Addressing Modes. Assembly language programming: Directives & a Sample Program, Assemble, Link & Run a program, More Sample programs, Control Transfer Instructions, Data Types and Data Definition, Full Segment Definition, Flowcharts and Pseudocode.

**08 Hours**

### Module-II

**Instruction Set:** Instructions sets description, Arithmetic and logic instructions and programs: Unsigned Addition and Subtraction, Unsigned Multiplication and Division, Logic Instructions, BCD and ASCII conversion, Rotate Instructions. INT 21H and INT 10H Programming: Bios INT 10H Programming, DOS Interrupt 21H. 8088/86 Interrupts, x86 PC and Interrupt Assignment.

**08 Hours**

### Module-III

**Assembly Language Programming:** Introduction to 8051 and instruction set, addressing modes, data transfer instructions, example programs, arithmetic instruction, logical instructions, jump and call subroutines, example programs.

**08 Hours**

### Module-IV

**ARM Embedded Systems:** Microprocessors versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table.

**08 Hours**

**Module-V**

**Introduction to the ARM Instruction Set:** Introduction to the ARM Instruction Set: Data Processing Instructions, Branch Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants, Simple programming.

**08 Hours****Course Outcomes:**

On completion of this course, the students are able to:

**CO1:** Describe the Intel 8085/8086 architecture with explanation of internal organization of some popular microprocessors/microcontrollers.

**CO2:** Construction of a maintainable assembly language program for an algorithm.

**CO3:** Conclude the Intel 8085/8086 real mode memory addressing.

**CO4:** Describe the functioning of peripheral ICs.

**CO5:** Designing of microprocessor and microcontroller-based system.

**Textbooks:**

- 1) Muhammad Ali Mazidi, "The 8051 Microcontroller; A Systems approach", Pearson Education 2013, ISBN 129207266, Chapters 1,2,3,5,7,8.
- 2) Kenneth J. "The 8051 Microcontroller architecture; Programming and applications", ISBN 0314772782.

**Reference Books:**

- 1) Predko, "Programming and Customizing the 8051 microcontrollers, ISBN:8131706974
- 2) Raj Kamal, Microcontrollers, architecture, programming, interfacing and system design, Pearson, education, 2005, ISBN:9788131706978.

## UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19UHV47	2-1-0-0	02	100	03 Hours	S&H

### Human Values Courses

This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as “H-102 Universal Human Values 2: Understanding Harmony” is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

**Pre-requisites:** Universal Human Values 1(desirable)

### Course Objectives:

The objective of the course is fourfold:

- Development of a holistic perspective based on self-exploration about themselves (humanbeing), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
- Strengthening of self-reflection.
- Development of commitment and courage to act.

**Course Topics:** The course has 28 lectures and 14 practice sessions in 5modules:

### Module – I

**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration– what is it? - Its content and process; Natural Acceptance and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking- disliking.

**08 Hours**

**Module – II****Understanding Harmony in the Human Being - Harmony in Myself!**

Understanding human being as a co-existence of the sentient “I: “and the material “Body” Understanding the needs of Self (“I”) and “Body”-happiness and physical facility Understanding the Body as an instrument of “I (I being the doer, seer and enjoyer) Understanding the characteristics and activities of “I and harmony in “I . Understanding the harmony of with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

**08 Hours****Module – III****Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher- student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students’ lives.

**08 Hours****Module – IV****Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

**08 Hours****Module – V****Implications of the above Holistic Understanding of Harmony on Professional Ethics**

Natural acceptance of human values Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and

characteristics of people friendly and eco- friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial I) Sessions eg. to discuss the conduct as an engineer or scientist etc.

**08 Hours**

### **Course Outcome:**

On completion of the course students will be able to

- CO1:** Understand the significance of value inputs in a classroom and start applying them in their life and profession.
- CO2:** Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual etc.
- CO3:** Understand the value of harmonious relationship based on trust and respect in their life and profession.
- CO4:** Understand the role of a human being in ensuring harmony in society and nature.
- CO5:** Distinguish between ethical and unethical practices and start working out the strategy to actualize a harmonious environment wherever they work.

### **Textbooks:**

- 1) Human Values and Professional Ethics by RR Gaur, R Sangal, GP Bagaria, Excel Books, New Delhi, 2010

### **Reference Books-3.2**

- 1) Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- 2) Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- 3) The Story of Stuff (Book). The Story of My Experiments with Truth- by Mohandas Karamchand.
- 4) Gandhi Small is Beautiful - E. F. Schumacher.
- 5) Slow is Beautiful - Cecile Andrews
- 6) Economy of Permanence - J C Kumarappa
- 7) Bharat Mein Angreji Raj - Pandit Sunderlal
- 8) Rediscovering India - by Dharampal
- 9) Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
- 10) India Wins Freedom - Maulana Abdul Kalam Azad
- 11) Vivekananda - Romain Rolland (English)
- 12) Gandhi - Romain Rolland (English)

**Mode Of Conduct** (L-T-P-C 2-1-0-3 or 2L:1T:0P 3 credits)

Lectures hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions. While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration. Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, including HSS faculty. Teacher preparation with a minimum exposure to at least one 8-day FDP on Universal Human Values is deemed essential.

**Assessment:** This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.

Example: Assessment by faculty mentor: 10 marks Self-assessment: 10 marks Assessment by peers: 10 marks  
Socially relevant project/Group Activities/Assignments: 20 marks.

Semester End Examination: 50 marks

The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

## PROFESSIONAL DEVELOPMENT OF ENGINEERS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19PDE49	1:0:2:0	02	CIE:50 SEE:50	03 Hours	PT-II

### Course Objectives:

This course will enable students to:

- Explain instances when sending email is necessary and appropriate.
- Create an email subject line that accurately describes the content of the message.
- Clarify and prioritize one's objectives and goals, by creating more planning time.
- Set and accomplish goals by self-reflection and self-monitoring
- Identify, prevent, and manage stress to improve academic success.
- Distinguishing between management and leadership and sharpening interpersonal and communication Skills.

### Module – I

**Team Building:** Defining team and its important elements, Clarifying the advantages and challenges of teamwork, understanding bargains in team building, defining behavior to sync with team work, Team building activities.

**Email etiquette:** Before you start typing: what to send by email, “What I’m trying to say”: creating an accurate subject line It's still business writing: 12 common errors to avoid, before clicking send : checking, proofing and copying, Damage control: Rx for bad email moments.

**06 Hours**

### Module – II

**Time Management:** Assessing time management strengths and weaknesses, Removing the barriers of productivity Overcoming the procrastination habit Focusing and staying in the zone Learning to be present: the power of now Managing tasks, projects, goals and Ideas Determining and managing priorities.

**06 Hours**

### Module – III

**Stress Management:** Achieving work-life balance by becoming better at stress management, approaching stress management in a scientific manner, enhancing personal effectiveness through managing stress, learning stress management techniques,  
Responding resourcefully to stress situations.

**Goal Setting:** Developing a mission statement, creating goal, establishing specific, measurable, achievable, realistic and time-targeted (S.M.A.R.T) goals, constructing action Steps, Making

**06 Hours**

### Module – IV

**Business Etiquettes:** Importance of Business Etiquettes, Difference between Social and Business Etiquettes,

Types of Business Etiquettes – Dining, Telephone, Office, Meeting, Dressing, Cubicle and Networking an action plan presentation.

**Leadership Skills:** What is Leadership? Leaders V/s Followers, Managers V/s Leaders, Testing your Leadership Potential, Your Personality – Conduit of Leadership, Team Leadership, Leadership & Conflict Resolution, Assertiveness and Leadership.

**06 Hours**

### **Module – V**

**SWOT:** Understanding SWOT, SWOT analysis, Understand the concept behind SWOT analysis, Understand the value of SWOT analysis on an individual, successfully perform a SWOT analysis.

**Individual Presentations:** Individual presentations by the Participants, Presentations would be followed by question & answer sessions, Extensive feedback would be given by the trainer on the strengths & areas of improvement, Review of performance when compared with previous semesters, Action plan for improvement for each individual student.

**06 Hours**

### **Course Outcomes:**

On completion of this course, the students will be able to:

- CO1:** Master effective email structures to achieve clarity and successful communication.
- CO2:** Address the importance of understanding readers.
- CO3:** Demonstrate self-management by setting reasonable boundaries.
- CO4:** Implement the steps of the self-regulation cycle using the SMART goals model
- CO5:** Monitor effectiveness of stress management techniques and revise to meet current needs.
- CO6:** Students will understand and be able to use a process for decision making

Improve nature and style of sensible writing and acquire employment and workplace communication skills

# **V Semester**

## **Course Syllabus**

## SOFTWARE ENGINEERING

Course Code	L: T:P:S	Credits	Exam marks	Exam Duration	Course Type
19CST51	3:0:0:0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

This course will enable students to,

- Software process models and compare their applicability
- Identify the key activities in managing a software project
- Concepts of requirements engineering and Analysis Modeling
- Apply systematic procedure for software design and deployment
- Compare and contrast the various testing and maintenance

### Module – I

**Software Process and Project Management:** The evolving role of software – the changing nature of software-Life cycle models-Waterfall-Incremental-Spiral-Evolutionary- Prototyping-Concurrent development – Specialized process models - Verification – Validation - Life cycle process - Development process - System engineering hierarchy - Introduction to CMM – Levels of CMM.

**08 Hours**

### Module – II

**Requirement Analysis and Specifications:** Functional and Non-Functional - User - System - Requirement Engineering Process - Feasibility Studies –communication practices- Requirements - Elicitation - Validation and management - Fundamental of requirement analysis – Analysis principles– Structured System Analysis - Software prototyping - Prototyping in the Software Process - Data - Functional and Behavioral Models - Structured Analysis and Data Dictionary.

**08 Hours**

### Module – III

**Software Design:** Design process - Modular design - Design heuristic - Design model and document - Architectural design - Software architecture - Data design - Architecture data - Transform and transaction mapping - User interface design – User interface design principles.

**08 Hours**

### Module – IV

**Testing and Implementation:** Levels-Software Testing Fundamentals- Types of s/w test-Whitebox testing-Basis path testing-Black box testing-Control Structure Testing-Regression testing strategies Strategic approach and issues-UNIT testing-Integration testing- Validation Testing-System testing and debugging. Case studies - Writing black box and whitebox testing-Coding Practices Refactoring.

**08 Hours**

## Module – V

**Project Management and Estimation:** Software cost estimation - COCOMO model - Quality management - Quality concepts- SQA - Software reviews - Formal technical reviews - Formal approaches of SQA and software reliability - Software maintenance - SCM - Need for SCM - Version control - Introduction to SCM process - Software configuration items. Re-Engineering – Software engineering - Reverse engineering - Restructuring-Forward engineering.

**08 Hours**

### Course Outcomes:

On completion of this course, the students will be able to,

**CO1:** Identify and apply software lifecycle model for a given problem and will know the criteria for each level of CMM

**CO2:** Comprehend types of requirements and summarize Requirement Engineering Process

**CO3:** Design data, functional and behavioral model for any given software requirement

**CO4:** Identify and analyze level of testing and perform white box testing and black box testing for a given problem

**CO5:** Describe concepts of software quality assurance and software configuration management

### Textbooks:

- 1) Rogar Pressman, “Software Engineering and Application”, 7th Edition, McGraw Hill Education Publication, 2009, ISBN-13: 9789339212087.
- 2) Ian Sommerville, “Software Engineering”, 8th Edition, ISBN-10-9332582696, ISBN-13- 978-9332582699, Pearson Education (24 May 2017).
- 3) Stephan Schach, “Software Engineering”, Tata McGraw Hill, 2007.
- 4) Rajib Mall, “Fundamentals of Software Engineering”, 3rd Edition, PHI Learning Private Limited, 2009, ISBN-10-9788120338197, ISBN-13-978-8120338197.
- 5) Kelkar S.A., “Software Engineering”, ISBN10: 8120332725, ISBN13: 9788120332720 Publisher: Prentice-Hall of India Pvt. Ltd, 2007.

### REFERENCES:

- 1) Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010, ISBN: 9788126523115
- 2) Pfleeger and Lawrance, “Software Engineering: Theory and Practice” Pearson Education, 2nd Edition, 2001

### E-Resources:

- 1) <https://www.pearson.com/us/higher-education/product/Sommerville-Software-Engineering-9th-Edition/9780137035151.html>.
- 2) <https://www.abebooks.com/9788120332720/Software-Engineering-Kelkar-S-A-8120332725/plp>

3) <https://www.wileyindia.com/pankaj-jalote-s-software-engineering-a-precise-approach.html>

**ADVANCED JAVA (IC)**

Course Code	L: T:P:S	Credits	Exam marks	Exam Duration	Course Type
19CSI52	3:0:2:0	04	CIE:50 SEE:50	03 Hours	IC

**Course Objectives:**

This course will enable students to:

- Learn String handling techniques of JAVA programming.
- Learn the concepts of Collection Frameworks through Collection class and Collection interface.
- Gain knowledge of Collection algorithms and Legacy classes and interfaces.
- Understand the file concepts and Streams in JAVA programming.
- Acquire knowledge of JAVA Database Connectivity.

**Module – I**

**String Handling and Wrapper classes:** The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using value Of ( ), Changing the Case of Characters Within a String, Additional String Methods, String Buffer, String Builder, Primitive Type Wrappers.

**08 Hours****Module – II**

**Collections Framework-1:** Collections Overview, Recent changes to Collections, The Collection Interfaces, The Collection Classes, accessing a Collection via an Iterator, Storing User-Defined Classes in Collections, The Random Access Interface.

**08 Hours****Module – III**

**Collections Framework-2:** Working with Maps, Comparators, the Collection Algorithms, Why Generic Collections, The Legacy Classes and Interfaces, Parting Thoughts on Collections.

**08 Hours****Module – IV**

**Files I/O:** Files, The Closeable and Flushable Interfaces, The Stream Classes, The Byte Streams, The Character Streams, The Console Class, Using Stream I/O.

**08 Hours****Module – V**

**JDBC:** The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; Result Set; Transaction Processing; Metadata, Data types, Exceptions.

**08 Hours**

**Lab Programs:**

- 1) Write a Java program to use String/Wrapper class and its methods.
- 2) Write a Java program to implement interface through Collection.
- 3) Write a Java program to access a collection through an iterator.
- 4) Write a Java program to print word count of a file using Stream I/O.
- 5) Write a Java program to execute select query using JDBC.
- 6) Write a Java program to update customer information.

**Course Outcomes:**

On completion of this course, the students will be able to:

**CO1:** Implement String handling techniques in JAVA programming effectively.

**CO2:** Access Collection class and Collection interface for JAVA programming.

**CO3:** Interpret Collection algorithms and use Legacy classes and interfaces.

**CO4:** Interpret concepts of Input/Output Streams in Files.

**CO5:** Implement the concepts of connectivity of Database through JDBC

**Textbooks:**

- 1) Herbert Schildt, "JAVA the Complete Reference", 9<sup>th</sup> Edition, Tata McGraw Hill, 2011, ISBN- 13: 9781259002465.
- 2) Jim Keogh, "J2EE - The Complete Reference", 1<sup>st</sup> Edition, McGraw Hill, 2017, ISBN-13: 9780070529120.

**Reference Book:**

- 1) Y. Daniel Liang, "Introduction to JAVA Programming", 10<sup>th</sup> Edition, Pearson Education, 2013, ISBN-13: 978-0133761313

**E-Resources:**

- 1) <https://www.udemy.com/course/advanced-java-programming/>

**COMPUTER NETWORKS(IC)**

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI53	3:0:2:0	04	CIE:50 SEE:100	03 Hours	IC

**Course Objectives:**

This course will enable students to:

- Understand the basics of dataflow, network categories, models and different types of switched networks used in communication.
- Know different types of error detection and correction techniques and also, error control protocols applied in the data link layer.
- Compare the design, working and implementation of Internet protocols as well as routing protocols responsible for network layer communication.
- Gain Knowledge about TCP, UDP protocols and also, network security concepts.
- Learn the use of various application layer protocols.

**Module – I**

**Introduction, Network Models & Switching:** Data Communications, Networks, Network Types. Network Models: TCP/IP Protocol Suite, The OSI Model Switching: Circuit-Switched Networks, Packet Switching.

**08 Hours****Module–II**

**Error Detection and Correction & Data Link Control (DLC):** Error Detection and Correction: Introduction, Block Coding, Cyclic Codes, Checksum, Forward Error Correction. Data Link Control: DLC Services, Data-Link Layer Protocols, HDLC, PPP (Framing, Transition phases only).

**08 Hours****Module – III**

**Network Layer Protocols & Routing:** Network Layer Protocols: IPv4 addressing, Internet Protocol (IP), Mobile IP. Routing: Introduction, Routing Algorithms, Unicast Routing Protocols. Next Generation IP: IPv6 addressing, IPv6 protocol.

**08 Hours****Module – IV**

**Transport and End-to-End protocols:** User Datagram Protocols (UDP), Transmission Control Protocol (TCP), TCP Congestion Control. Overview of Network Security: Symmetric-Key Cryptography, Public-Key Cryptography.

**08 Hours****Module – V**

**Applications, Network Security:** Overview of the Application Layer, Domain Name System (DNS), Electronic Mail (E-Mail), World Wide Web (WWW), Remote Login Protocols, File Transfer and FTP.

**08 Hours**

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**Course Outcomes**

On completion of this course, the students will be able to:

- CO1:** Establish appropriate switched networks based on the network models and use them for communication.
- CO2:** Resolve errors that occur during communication and also, to analyze DLC protocols.
- CO3:** Assign/map internet (logical) addresses to PDUs as well as, they can implement different routing algorithms
- CO4:** Implement network applications choosing either TCP or UDP depending on the requirements and can integrate security measures for the applications
- CO5:** Use application-level protocols in the current technology trends.

**Textbooks:**

- 1) Behrouz A. Forouzan: Data Communication and Networking, 5th Edition, Tata McGraw-Hill, July 2013, ISBN: 978-0-07-131586-9(Chapters 1, 2, 8, 10, 11,18,19, 20).
- 2) Nader F. Mir: Computer and Communication Networks, 2nd Edition, Pearson Education,2015, ISBN: 0133814742, (Chapters 8, 9, 10).

**Reference Books:**

- 1) William Stallings: Data and Computer Communication, 8th Edition, Pearson Education,2007, ISBN- 13:978-0133506488.
- 2) Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007, ISBN:978-0-12-385059-1.

**E-Resources:**

- 1) <https://archive.org/details/Data.Communications.and.Networking.5th.Edition>
- 2) <https://doc.lagout.org/network/Data%20Communications%20and%20Networking%20By%20Behrouz%20A.Forouzan.pdf>
- 3) <http://ptgmedia.pearsoncmg.com/images/9780133814743/samplepages/9780133814743.pdf>

## DATA WAREHOUSING & DATA MINING(IC)

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI54	3:0:2:0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to,

- Identify the scope and necessity of Data Mining and Warehousing for the society.
- Describe various Data Models and Design Methodologies of Data Warehousing destined to solve the root problems.
- Understand various Tools of Data Mining and their Techniques to solve the real time problems.
- Learn how to analyze the data, identify the problems, and choose the relevant algorithms to apply.
- Assess the Pros and Cons of various algorithms and analyze their behavior on real datasets.

### Module – I

**Data Mining:** Introduction - Steps in KDD - System Architecture – Types of data -Data mining functionalities - Classification of data mining systems - Integration of a data mining system with a data warehouse - Issues - Data Preprocessing – Data Mining Application.

**08 Hours**

### Module – II

**Data Warehousing:** Data warehousing components - Building a data warehouse - Multi Dimensional Data Model - OLAP Operation in the Multi- Dimensional Model - Three Tier Data Warehouse Architecture - Schemas for Multi-dimensional data Model - Online Analytical Processing (OLAP) - OLAP Vs OLTP Integrated OLAM and OLAP Architecture.

**08 Hours**

### Module – III

**Association Rule Mining:** Mining frequent patterns - Associations and correlations - Mining methods Finding Frequent item set using Candidate Generation - Generating Association Rules from Frequent Item sets - Mining Frequent item set without Candidate Generation Mining various kinds of association rules - Mining Multi-Level Association Rule-Mining Multidimensional Association Rule- Mining Correlation analysis - Constraint based association mining.

**08 Hours**

### Module – IV

**Classification and Prediction:** Classification and prediction - Issues Regarding Classification and Prediction - Classification by Decision Tree Induction - Bayesian classification – Bayes’ Theorem -Naïve Bayesian Classification - Bayesian Belief Network - Rule based classification - Classification by Back propagation - Support vector machines - Prediction-Linear Regression.

**Module – V**

**Clustering, Applications and Trends In Data Mining:** Cluster analysis - Types of data in Cluster Analysis- Categorization of major clustering methods -Partitioning methods–Hierarchical methods - Density-based methods - Grid-based methods - Model based clustering methods -Constraint Based cluster analysis - Outlier analysis - Social Impacts of Data Mining- Case Studies: Mining WWW- Mining Text Database- Mining Spatial Databases.

08 Hours

**Course Outcomes:**

On completion of this course, the students will be able to,

- CO1:** Assess Raw Input Data and process it to provide suitable input for a range of datamining algorithm
- CO2:** Design and Modeling of Data Warehouse
- CO3:** Discover interesting pattern from large amount of data
- CO4:** Design and Deploy appropriate Classification Techniques
- CO5:** Able to cluster high dimensional data

**Textbooks:**

- 1) Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, 2nd Edition, Elsevier, 2007, ISBN-10 -9789380931913, ISBN-13-978-9380931913.
- 2) Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Published by Tata McGraw-Hill Education Pvt. Ltd., 2004, ISBN 10: 0070587418 / ISBN 13: 9780070587410.
- 3) Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007. ISBN-13-9788131714720, ISBN-10-8131714720.
- 4) G. K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006, ISBN-13:9788120350021, ISBN - 10 :8120350022.
- 5) Daniel T. Larose, “Data Mining Methods and Models”, Publisher-John Wiley & Sons, 2006, 2006, ISBN 8126507764, 9788126507764.

**References:**

- 1) Pieter Adriagus, Dolf Zantinge "Data Mining", Addison-Wesley Publisher, Pearson education, 2007, ISBN 978-81-317-0717-3.
- 2) Sam Anahory, Dennis Murray "Data Warehousing in the Real World", Pearson education, ISBN 978-81-317-0459-2, 2009.

**E-Resources:**

- 1) <https://study.com/academy/lesson/data-warehousing-and-data-mining-information-for-businessintelligence.html>
- 2) <http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf>
- 3) <https://www-users.cs.umn.edu/~kumar001/dmbook/index.php>

## ARTIFICIAL INTELLIGENCE

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST551	3:0:0:0	03	CIE:50 SEE:50	03 Hours	PEC

### Course Objectives:

This course will enable students to:

- Understand AI technique to a given concrete problem
- Study non-trivial AI techniques to handle complex problem
- Understand uncertainty and Problem-solving techniques.
- Learn various symbolic knowledge representations to specify domains and reasoning tasks of a situated software agent.
- Gain knowledge on logical systems for inference over formal domain

### Module-I

**Introduction:** What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem solving: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies.

**08 Hours**

### Module-II

**Informed Search, Exploration, Constraint Satisfaction, Adversial Search:** Informed search strategies; Heuristic functions; On- Line search agents and unknown environment. Constraint satisfaction problems; Backtracking search for CSPs. Adversial search: Games; Optimal decision in games; Alpha- Beta pruning.

**08 Hours**

### Module-III

**Logical Agents:** Knowledge-based agents; The wumpus world as an example world; Logic; propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

**08 Hours**

### Module-IV

**First-Order Logic, Inference in First-Order Logic-1:** Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic. Propositional versus first-order inference; Unification and lifting

**08 Hours**

### Module-V

**Inference in First-Order Logic-2:** Forward chaining; backward chaining; Resolution.

**08 Hours**

**Course Outcomes:**

On completion of this course, students will be able to:

**CO1:** Design intelligent agents for solving simple gaming problems.

**CO2:** Apply non-trivial AI techniques to handle complex problems.

**CO3:** Apply various symbolic knowledge representation to specific problems.

**CO4:** Design Knowledge-based agents.

**CO5:** Describe syntax and semantics of first-order logic.

**Textbooks:**

- 1) Stuart Russel, Peter Norvig: “Artificial Intelligence A Modern Approach”, 2nd Edition, Pearson Education, 2003, (Chapters 1.1, 2, 3.1 - 3.4, 4.1, 4.2, 4.5, 5.1, 5.2, 6.1- 6.3, 7, 8, 9,10, 11.1, 11.2, 11.4, 11.5, 13.1, 13.4, 13.5, 13.6,) ISBN:0-13-103805-2.

**Reference Books:**

- 1) Elaine Rich, Kevin Knight: “Artificial Intelligence”, 3rd Edition, Tata McGraw Hill, 2009,ISBN-10: 0070087709.
- 2) Nils J. Nilsson: “Principles of Artificial Intelligence”, Elsevier, 1980, ISBN: 978-3-540-11340-9.

**E-Resources:**

- 1) <http://stpk.cs.rtu.lv/sites/all/files/stpk/materiali/MI/Artificial%20Intelligence>
- 2) <http://www.getfreebooks.com/16-sites-with-free-artificial-intelligence-ebook>

## IMAGE PROCESSING

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST552	3:0:0:0	03	CIE:50 SEE:50	03 Hours	PEC

### Course Objectives:

This course will enable the students to:

- Study the fundamental concepts of a digital image processing system.
- Understand spatial domain for image enhancement.
- Gain the knowledge of image filtering in frequency domain.
- Learn the noise models and restoration concepts.
- Expose to color image processing and different transformation techniques.

### Module – I

**Introduction:** Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships Between Pixels- Neighbors and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing.

**08 Hours**

### Module – II

**Image Enhancement in The Spatial Domain:** Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

**08 Hours**

### Module – III

**Image Enhancement in Frequency Domain:** Introduction, Fourier Transform, Discrete Fourier Transform (DFT), properties of DFT, Discrete Cosine Transform (DCT), Image filtering in frequency domain.

**08 Hours**

### Module – IV

**Image Restoration:** Image enhancement versus Image restoration, Image degradation/restoration model, Inverse filter, Noise models, Restoration using spatial filtering: Arithmetic Mean filters, Geometric mean filters, Harmonic mean filters, Order Statistics filters: Median filter, Max & min filters, Midpoint filter, Adaptive filters, Wiener filter, Constrained Least squares filter.

**08 Hours**

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**Module – V**

**Color Image Processing:** Fundamentals of color image processing, Color models, Conversion of color models from one form to other form, Pseudo color image processing, Full color image Processing, Color Image Quantization, Histogram of color Image. Basic Image Transforms: Discrete Cosine and Sine transform, Z-transform, Fourier transform, Laplacian transform, Two-dimensional orthogonal unitary transforms, Properties of Unitary Transforms, K-L Transform, Introduction to Wavelet Transform.

**08 Hours****Course Outcomes:**

After studying this course, students will be able to

**CO1:** Review the fundamental concepts of a digital image processing system.

**CO2:** Apply spatial domain for image enhancement.

**CO3:** Develop frequency domain for image enhancement

**CO4:** Use various noise models and apply appropriate filtering techniques.

**CO5:** Perform colour image processing and various transformations on images.

**Textbooks:**

- 1) Digital Image Processing by Rafael C. Gonzalez & Richard E. Woods , 4<sup>th</sup> Edition, Pearson Education, 2018. (ISBN:9780133356779)
- 2) Fundamentals of Digital Image Processing by Anil K. Jain, Prentice Hall, 4th Edition, 2014 (ISBN: 9780133361650)

**Reference Books:**

- 1) S. Sridhar, Digital Image Processing, Oxford University Press, 2nd Ed, 2016. (ISBN:9780199459353)

**E-Resources:**

- 1) <http://www.nptelvideos.in/2012/12/digital-image-processing.html>
- 2) [http://in.mathworks.com/discovery/digital-image-processing.html?s\\_tid=srchtitle](http://in.mathworks.com/discovery/digital-image-processing.html?s_tid=srchtitle)

## SOFT COMPUTING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST553	3:0:0:0	03	CIE:50 SEE:50	03 Hours	PEC

### Course Objectives:

This course will enable students to:

- Learn the basic concepts of soft computing techniques and their roles in building intelligent machines.
- Understand how to apply a neural network for a particular problem.
- Gain the knowledge of fuzzy logic in solving engineering problems.
- Study the various computational methods.
- Acquire the knowledge of genetic algorithm.

### Module – I

**Introduction:** What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

**Neural Networks-1(Introduction & Architecture)** Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.

**08 Hours**

### Module – II

**Neural Networks-1(Introduction & Architecture):** Various learning techniques; perception and convergence rule, Auto-associative and hetero-associative memory.

**Neural Networks-II (Back propagation networks) Architecture:** perceptron model, solution, single layer artificial neural network, multilayer perceptron model; back propagation learning methods, effect of learning rule coefficient; back propagation algorithm, factors affecting back propagation training, applications.

**08 Hours**

### Module – III

**Fuzzy Logic-I (Introduction):** Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

**08 Hours**

### Module – IV

**Fuzzy Logic –II (Fuzzy Membership, Rules):** Membership functions, inference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzification & Defuzzification's, Fuzzy Controller, Industrial applications.

**08 Hours**

### Module – V

**Genetic Algorithm (GA):** Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

**08 Hours**

#### Course Outcomes:

On completion of this course, the students will be able to:

- CO1:** Describe soft computing techniques and their roles in build intelligent machines.
- CO2:** Apply soft computing methodology for a particular problem.
- CO3:** Deploy fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- CO4:** Use various soft computing approaches for a given problem.
- CO5:** Develop genetic algorithms to combinatorial optimization problems.

#### Textbooks:

- 1) S. Rajsekaran & G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications” Prentice Hall of India, 2<sup>nd</sup> edition, 2013, *ISBN-13*: 9788120353343.
- 2) S.N. Sivanandam & S.N. Deepa, “Principles of Soft Computing”, Wiley Publications, 2<sup>nd</sup> Edition, 2011, *ISBN-13*: 978-8126527410.

#### Reference Books:

- 1) Siman Haykin, Neural Networks Prentice Hall of India, Pearson publications, 2<sup>nd</sup> Edition, 2016, *ISBN-13*: 978-0-13-1471399.
- 2) Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India, 3<sup>rd</sup> Edition, 2013, *ISBN*: 978-0-470-74376-8.

#### E-Resources:

- 1) [www.igi-global.com/book/soft-computing-applications-database-technologies/37327](http://www.igi-global.com/book/soft-computing-applications-database-technologies/37327)
- 2) [www.tandfonline.com/doi/abs/10.1080/02564602.2001.11416974](http://www.tandfonline.com/doi/abs/10.1080/02564602.2001.11416974)

## ACCOUNTANCY & TAXATION

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSH56	3:0:0:0	03	CIE: 50 SEE: 50	03 Hours	HSMC

### Course Objectives:

- To develop a greater insight into the importance of Accounting and accounting terms
- To make the students capable of recording business transaction under double entry system.
- To introduce the students about financial statements
- To facilitate a clear perspective of Indian taxation system in terms of various types of taxes prevailing in India
- To help students to understand the concepts of tax management through deductions & exemptions available under Income tax act.

### Module – I

**Introduction to accounting** –Introduction: History and Development of Accounting –Meaning Objectives and functions of Accounting-Book-keeping V/s Accounting –Users of accounting data systems of bookkeeping and accounting – branches of accounting –advantages and limitations of accounting. Accounting Concepts and conventions: Meaning need and classification, accounting standards –meaning, need and classification of Indian accounting standards. Accounting principles V/s accounting standards, Classification of accounting transaction and accounts, rules of debit and credit as per Double Entry System.

**08 Hours**

### Module – II

**Accounting Process:** Journalizing and Ledger position, Preparation of different subsidiary books: Purchase Day Book, Sales Day Book, Purchase Returns Day Books, Sales Returns Day Book, Cash Book. Bank Reconciliation Statement: Meaning, Need, Definition, reason of differences between cashbook & passbook, Preparation of Trial Balance: Rectification of errors (Concept only)

**08 Hours**

### Module – III

**Preparation of Final Statement:** Meaning and objectives of financial statements, Preparation of Income statement & Balance sheet. (Sole proprietor)

**08 Hours**

### Module – IV

**Introduction to Tax:** Definition of Tax, Types of Tax, Assessment year, Previous year, Person, Assesses, Residential Status & Tax Liability, Canons of taxation, Heads of income, Gross Total Income Exempted Income u/s. 10, Tax slabs for Individual, PAN card, (Problems on residential Status of Individual Assessed and Incidence of Tax).

**08 Hours**

### Module – V

**Computation of Tax Liability:** Heads of Income (Concepts only)- Income from salary, Income from house property, Income from Business & Profession, Capital Gains, Income from other Sources, Gross Total Income Deductions U/s 80 C-80 U, Set Off & Carry Forward of Losses (Concepts only), Computation of Total Income and Determination of Tax Liability.

**08 Hours**

**Practical Components:**

- 1) Analyzing financial statement of various business organizations and comparing the accounting methods used.
- 2) Using online Income tax calculator to assess income of various individuals on the basis of different tax slabs.
- 3) Collecting Form-16 & statement to return of Income in terms of salaried individual

**Course Outcomes:**

Students will be able to:

- CO1:** To develop a greater insight into the importance of Accounting and accounting terms.
- CO2:** To make the students capable of recording business transaction under double entry system.
- CO3:** To introduce the students about financial statements.
- CO4:** To facilitate a clear perspective of Indian taxation system in terms of various types of taxes prevailing in India.
- CO5:** To help students to understand the concepts of tax management through deductions & exemptions available under Income tax Act.

**Textbook:**

- 1) T.S. Grewal: Accountancy, Sultan Chand & Sons(P) Ltd., New Delhi, Latest Edition
- 2) 7 Author series: Fundamental of Accounting, Vision Publishing House, Bangalore, Latest Edition

**Reference Books:**

- 1) Singhania & Singhania: Taxman Direct taxes-law & practice, Taxman Publications;
- 2) S.N. Maheshwari: Management Accounting and Financial Control, Sultan Chand & Sons(P)Ltd., New Delhi, Latest Edition
- 3) R.L.Gupta: Advanced Accountancy, Sultan Chand & Sons(P) Ltd., New Delhi, Latest Edition

## PROJECT PHASE – I

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSP57	0:0:0:8	02	CIE:50 SEE:50	03 Hours	Project

### Activity of Phase – I

Batch formation, project identification, literature survey, finalization of problem statement with objectives and outcomes, Synopsis submission, Preliminary seminar for the approval of selected topic and objectives.

### Course Outcomes:

- CO1:** Review the current state of Art and trends in their area of interest in current technologies and identify a suitable problem in their chosen subject domain with justification.
- CO2:** Survey the available research literature/documents for the tools and techniques to be used.
- CO3:** Examine the functional, non-functional, and performance requirements of their chosen problem definition.
- CO4:** Design system architecture and different components and develop all the system components using appropriate tools and techniques.
- CO5:** Work effectively in a team and use good project management practices and defend the project work as a team.

**EMPLOYABILITY SKILLS AND APTITUDE DEVELOPMENT**

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19PES59	1:0:2:0	02	CIE:50 SEE:50	03 Hours	P&T

**Course Objectives:**

This course will enable students to:

- Understand different types of Numerical / Arithmetical problems.
- Understand the different Data interpretation problems.
- To enhance interpersonal and soft skills for professional development.
- Enables students to develop their ability to reason by introducing them to elements of formal reasoning.
- To develop Problem Solving, confidence building, organizational, team working skills.

**Module – I**

**Quantitative Aptitude I:** Number System, Ratio Proportion and Partnership, Average.

**06 Hours**

**Module – II**

**Quantitative Aptitude II:** Percentage, Profit and Loss, Time and Work

**06 Hours**

**Module – III**

**Logical Reasoning - I:** Number Series, Letter Series, Blood Relations

**04 Hours**

**Module – IV**

**Logical Reasoning - II:** Analogy, Seating Arrangement, Data Arrangement

**04 Hours**

**Module – V**

**Verbal Ability:** Comprehension, Sentence Correction, Sentence Completion.

**05 Hours**

**Course Outcomes:**

Students will be able to:

- CO1:** Solve and analyse different types of Numerical / Arithmetic problems.
- CO2:** Identify logical relations among statements and analyse logically complex statements into their truth functional or quantificational components.
- CO3:** Develop enhanced productivity efficiency and effectiveness.
- CO4:** Be equipped with a set of transferable team building skills and general employability skills.
- CO5:** Helps to improvise the logical thinking and ability to understand the fundamental concepts and its application of the same.

# **VI Semester Course Syllabus**

## CLOUD COMPUTING (IC)

Course Code	L: T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CSI61	3: 0 : 2 : 0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to

- Identify the Cloud infrastructure components and service management processes
- Explain the fundamentals of cloud computing
- Gain the knowledge about virtualization and its techniques.
- Illustrate the cloud application programming and Aneka platform
- Differentiate Various cloud platforms used in industry

**Prerequisite:** Computer Networks, Database Management System, Operating system

### Module – I

**Introduction:** Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility- Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Google App Engine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjra soft Aneka. Virtualization: Introduction, Characteristics of Virtualized, Virtualization and Cloud Computing, Pros and Cons of Virtualization

**08 Hours**

### Module – II

**Cloud Computing Architecture:** Introduction, Cloud Reference Model, Architecture, Infrastructure /Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Definition, Cloud Interoperability and Standards Scalability and Fault Tolerance Security, Trust, and Privacy Organizational Aspects. Aneka: Cloud Application Platform, Framework Overview, Anatomy of the Aneka Container, From the Ground Up: Platform Abstraction Layer, Fabric Services, foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management, Aneka SDK, Management Tools.

**08 Hours**

### Module – III

**Concurrent Computing:** Thread Programming, Introducing Parallelism for Single Machine Computation, Programming Applications with Threads, what is a Thread? Thread APIs, Multithreading with Aneka, Introducing the Thread Programming Model, Aneka Thread vs. Common Threads. High-Throughput

Computing: Task Programming, Task Computing, characterizing a Task, Computing Categories, Frameworks for Task Computing, Task-based Application Models, Embarrassingly Parallel Applications, Parameter Sweep Applications, Workflow Applications with Task Dependencies.

**08 Hours**

#### **Module – IV**

**Data Intensive Computing:** Map-Reduce Programming, what is Data-Intensive Computing? Characterizing Data-Intensive Computations, Challenges Ahead, Historical Perspective, Technologies for Data-Intensive Computing, Storage Systems, Programming Platforms.

**08 Hours**

#### **Module – V**

**Cloud Platforms in Industry:** Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google App Engine, Architecture and Core Concepts, Application Lifecycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Applications: Scientific Applications, Business and Consumer Applications, CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.

**08 Hours**

#### **Lab Programs:**

List of Experiments

- 1) Installation and Configuration of Just cloud.
- 2) Working in Cloud9 to demonstrate different language.
- 3) Working and installation of Google App Engine.
- 4) Working and installation of Microsoft AZURE.
- 5) Working with Mangra soft Aneka Software.
- 6) Create an application (Ex: Word Count) using Hadoop Map/Reduce

#### **Course Outcomes**

On completion of this course, the students will be able to:

- CO1:** Explain cloud computing, classify services of cloud computing
- CO2:** Illustrate architecture and programming in cloud
- CO3:** Demonstrate data intensive computing.
- CO4:** Apply cloud computing services to commercial systems for deploying cloud
- CO5:** Analyzing different Cloud platform in industry and their applications

#### **Text Books:**

- 1) Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi, “Mastering Cloud Computing”, McGraw Hill Education, ISBN: 9780124095397

**Reference Books:**

- 1) Dan C. Marinescu, “Cloud Computing Theory and Practice”, Morgan Kaufmann, Elsevier 2013.
- 2) Thomas Erl: “Cloud Computing”, Pearson Education, 1st Edition, 2014, ISBN-13: 978-9332535923.

**Reference Online Resources:**

- 1) <http://index-of.co.uk/Cloud-Computing-Books/Mastering%20Cloud%20Computing%20-%20Rajkumar%20Buyya.pdf>
- 2) <http://nptel.ac.in/courses/106105033/41>
- 3) <http://video.mit.edu/watch/mitef-nyc-cloud-computing-8347/>

## ANDROID APPLICATION DEVELOPMENT(IC)

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CSI62	3 : 0 : 2 : 0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to:

- Outline the Android SDK features and the Development Framework and understanding Activities.
- Learn adaptive, responsive user interfaces that work across a wide range of devices.
- Identify background work and long-running tasks in Android applications
- Describe the concepts of Storing, sharing and retrieving data in Android applications
- Learn permissions, security and performance affect applications.

**Prerequisite:** Basic Knowledge of JAVA Programming and XML (Extension Markup Language)

### Module- I

**Basics of Android** What Is Android? Android Versions, Features of Android, Architecture of Android, Android Devices in the Market, The Android Market, Obtaining the Required Tools, Eclipse, Android SDK, Android Development Tools (ADT), Creating Android Virtual Devices (AVDs), Creating Your First Android Application, Anatomy of an Android Application. Understanding Activities, Applying Styles and Themes to Activity, Hiding the Activity Title, displaying a Dialog Window, Displaying a Progress Dialog, Linking Activities Using Intents, Resolving Intent Filter Collision, Returning Results from an Intent.

**08 Hours**

### Module- II

**Components of Screen, Views and Layouts** Understanding the Components of a Screen, Views and View Groups, Linear Layout, Absolute Layout, Table Layout, Relative Layout, Frame Layout, Scroll View, Adapting to Display Orientation, Anchoring Views, Resizing and Repositioning, Managing Changes to Screen Orientation, Persisting State Information during Changes in Configuration, Detecting Orientation Changes, Controlling the Orientation of the Activity, Creating the User Interface Programmatically, Basic Views.

**08 Hours**

### Module- III

**Image Views, Preferences ( ) and Storage** Using Image Views to Display Pictures - Gallery and Image View Views, Image Switcher, Grid View, Using Menus with Views - Creating the Helper Methods, Options Menu, Context Menu, Saving and Loading User Preferences - Using get Shared Preferences( ), Using get Preferences(), Persisting Data to Files - Saving to Internal Storage, Saving to External Storage (SD Card), Choosing the Best Storage Option, Using Static Resources, Creating and Using Databases.

**08 Hours**

**Module- IV**

Content Provider, SMS Messaging Sharing Data in Android, using a Content Provider - Predefined Query String Constants, Projections, Filtering, Sorting, Creating Your Own Content Providers - Using the Content Provider. SMS Messaging - Sending SMS Messages Programmatically, Getting Feedback after Sending the Message, Sending SMS Messages Using Intent, Receiving SMS Messages, Updating an Activity from a Broadcast Receiver, Invoking an Activity from a Broadcast Receiver.

**08 Hours****Module- V****Services, Activities and Publishing APK Files.**

Creating Your Own Services - Performing Long-Running Tasks in a Service, Performing Repeated Tasks in a Service, Executing Asynchronous Tasks on, Separate Threads Using Intent Service, Communicating between a Service and an Activity, Binding Activities to Services. Preparing for Publishing, Versioning, Digitally Signing Your Android Applications, Deploying APK Files - Using the adb.exe Tool, using a Web Server, publishing on the Android Market, Creating a Developer Profile, Submitting Your Apps.

**08 Hours****Lab Programs**

Programs supplement the lecture concepts will be based on the latest version of Android SDK.

**PART-A**

- 1) Develop an android app which displays “Hello World” message
- 2) Using Android, Create a login Activity. It asks “username” and “password” from user. If username and password are valid, it displays Welcome message using new activity
- 3) Create Implicit Intents
- 4) “Happy Birth Day” App using Text View and Image View
- 5) Set and retrieve shared preferences

**PART-B**

- 1) Develop an android app which displays a form to get following information from user.
  - 1) Username 2) Password 3) Email Address 4) Phone Number 5) Country
 Form should be followed by a Button with label “Submit”. When user clicks the button, a message should be displayed to user describing the information entered. Utilize suitable UI controls (i.e. widgets). [When user enters country in Auto Complete Text View, list of states should be displayed in Spinner automatically]
- 2) The Simple Calculator app has two edit texts and four buttons. When you enter two numbers and click a button, the app performs the calculation for that button and displays the result.
- 3) Develop an android app for Text to Speech.
- 4) Create the MP3 player like application with service

**Course Outcomes:**

On completion of this course, students will be able to:

- CO1:** Comprehend the basic features of Android Platform and Create Activities in Android.
- CO2:** Demonstrate the design concepts of user interface using components and views in Android.
- CO3:** Create and use databases for Android Application.
- CO4:** Implement messaging services in Android.
- CO5:** Deploy mobile applications in various marketplace for distribution

**Textbooks:**

- 1) Wei – Meng Lee: “Beginning Android Application Development”, Wiley publications, ISBN: 978-1-118-01711-1, (Chapters 1-8,10,11).
- 2) Reto Meier: “Professional Android 4 Application Development”, Wiley publications Publisher, 2012, ISBN-10: 812653608X

**Reference Books:**

- 1) Mark Murphy: “Beginning Android 3”, Apress Springer India Pvt. Ltd., 1st Edition, 2011, ISBN-13: 978-1-4302-3297-1
- 2) Sayed Hashimi, Satya Komatineni, Dave MacLean; Pro Android 4; Apress Springer India Pvt Ltd; 1st Edition; 2012; ISBN: 978-1-4302-3930-7.
- 3) Reto Meier: “Professional Android 2 Application Development”, Wiley India Pvt. Ltd., 1st Edition, 2012, ISBN: 9788126525898.
- 4) James Steele: “The Android Developer’s Cookbook: Building Applications with the Android SDK”, Addison-Wesley Professional, 2010.

**E-Resources:**

- 1) <https://developers.google.com/training/adf>
- 2) <https://goo.gl/ADKvq8>
- 3) <https://innovator.samsungmobile.com>

## BIG DATA ANALYTICS

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CST63	3 : 0 : 0 : 0	03	CIE: 50SEE: 50	03 Hours	PCC

### Course Objectives:

This course will enable students to

- Understand Big – Data, Hadoop Distributed File system and Map Reduce.
- Explore Hadoop tools and manage Hadoop Administration.
- Appraise the role of Business intelligence and its applications across industries.
- Assess core data mining techniques for data analytics.
- Learn various Text Mining techniques.

### Prerequisite:

Good knowledge skill on Database and Data Structures

#### Module – I

Introduction To Big Data: Big Data and its importance, Four Vs, Big data applications. Introduction To Hadoop: Hadoop Distributed File System Basics, Hadoop components, Hadoop Eco-System, Hadoop Map Reduce Framework.

**08 Hours**

#### Module – II

Essential Hadoop Tools – Yarn, Hive, Oozie, Pig, Flume, Hadoop YARN Applications, Managing Hadoop with Apache Ambari, Basic Hadoop Administration Procedures.

**08 Hours**

#### Module – III

Business Intelligence Concepts and Application – BI – Tools, Skills, Applications, Data Warehousing – Approaches and Architecture, Data Mining – CRISP – DM, Techniques, Tools, Myths, Mistakes, Data Visualization – Types of charts.

**08 Hours**

#### Module – IV

Decision Trees- Pseudo code, Regression – Logistic, Advantages and Disadvantages, Artificial Neural Networks – Design principles, Steps in developing ANN, Advantages and Disadvantages, Cluster Analysis - K-means algorithm, Association Rule Mining - Apriori algorithm.

**08 Hours**

**Module – V**

Text Mining – Architecture, TDM, Applications, Naïve-Bayes Analysis - Model, Advantages and Disadvantages, Support Vector Machines - Model, Advantages and Disadvantages, Web Mining – Content, Structure, Usage, Social Network Analysis - Techniques and Algorithm, Page Rank, Practical Considerations.

**08 Hours**

**Course Outcomes:**

On completion of this course, the students are able to:

**CO1:** Master the concepts of Big Data, HDFS and MapReduce framework

**CO2:** Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop Administration

**CO3:** Recognize the role of Business Intelligence, Data warehousing and Visualization in decisionmaking

**CO4:** Demonstrate the importance of core data mining techniques for data analytics

**CO5:** Illustrate and analyze Text Mining Techniques

**Text Books:**

- 1) Douglas Eadline, "Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem", 1st Edition, Pearson Education, 2016. ISBN-13: 978- 9332570351
- 2) Anil Maheshwari, "Data Analytics", 1st Edition, McGraw Hill Education, 2017. ISBN-13: 978-9352604180

**Reference Books:**

- 1) Tom White, —Hadoop: The Definitive Guide ,4 Edition, O'Reilly Media,
- 2) Boris Lublin sky, Kevin T. Smith, Alexey Yakubovich, —Professional HadoopSolutions",1st Edition, Wrox Press, 2014ISBN-13: 978-8126551071
- 3) Eric Sammer, —Hadoop Operations: A Guide for Developers and Administrators",1<sup>st</sup>Edition,O'Reilly Media, 2012.ISBN-13: 978-9350239261

**E-Resources:**

- 1) [https://www.tutorialspoint.com/big\\_data\\_tutorials.htm](https://www.tutorialspoint.com/big_data_tutorials.htm)
- 2) <https://nptel.ac.in/courses/106/104/106104189/>

## FULL STACK DEVELOPMENT (IC)

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CSI64	3 : 0 : 2 : 0	04	CIE:50 SEE:50	03 Hours	IC

### Course Objectives:

This course will enable students to,

- Use HTML, CSS and JavaScript in web page design.
- Access the DOM objects, filters, forms in JavaScript's query.
- Write programs using Hooks, components and Events in React JS.
- Create basic web applications with Node.js, Express JS.
- Understand with the database connectivity and reactive forms using JavaScript's

**Prerequisite:** Basic knowledge of programming and JAVA Programming.

### Module – I

**JavaScript:** Basics: Variables, Operator, DOM, Arrays, Functions, Arrow Functions, Classes, Objects, Event Handling, Map, Babel JS, React Introduction, React Installation. Simple React programs and CSS styling.

**08 Hours**

### Module – II

**React JS:** Functional Component, Class Component, Event Based Component, Props, States, set State, Event Handling, Binding Event Handler, Life Cycle Methods, Lists & Keys, Forms and user inputs, Rendering: Conditional Rendering, List Rendering.

**08 Hours**

### Module – III

**Hooks:** useState, useMenu, useEffect, Axios Package, useRef, useContext, useReducer, useCallback, useInput, React Router, APIs, Practical React: icons, video player, credit card, model, chart, count up.

**08 Hours**

### Module – IV

**Introduction to Node.js:** What is Node.js? Features of Node.js, Setup Development Environment- Installing, Node.js, Working with REPL, Node.js Console, Node.js Module, Node Package Manager Node.js Basics, File System, HTTP and HTTPS, Creating Web Server- Handling http request, Node.js Callbacks, Node.js Events.

**08 Hours**

### Module – V

**Database Connectivity and Reactive Forms:** Promises, Express.js, Database Connectivity –Connecting to RDBMS and NoSQL database, Performing CRUD operations, What is Reactive Forms, Syncing of HTML and Form, Form Control Arrays, Relative Forms, Value changes and Reacting to status, Create Reactive form

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through code, Adding Validation, Adding Validation, Grouping, Custom Validators.

**08 Hours****Lab Programs**

1. Write a ReactJS Program using useState hook.
2. Write a ReactJs Program to style a web page using CSS.
3. Write a ReactJS Program to fetch details from spotify API.
4. Write a ReactJs Program to implementing routing using react-router-dom package.
5. Write a ReactJS Program to implement digital clock using hook.
6. Write a ReactJs program create login form.
7. Write a ReactJs program create a simple greeting website.

**Course Outcomes:**

On completion of this course, the students will be able to,

**CO1:** Develop programs in HTML, JavaScript.

**CO2:** Design programs using ReactJS components.

**CO3:** Test and deploy web pages using React Hooks.

**CO4:** Develop programs in Node JS, Express JS.

**CO5:** Design programs using React JS with database connectivity.

**Textbook:**

- 1) Brad Dayley, "Node.js, MongoDB, and AngularJS Web Development, 2018, ISBN- 13: 9789352865505.

**Reference Book:**

- 1) Adam Freeman, "Pro Angular JS", A press Publications, 2<sup>nd</sup> Edition, 2017, ISBN-13: 9781484223062.
- 2) Learning React Functional Web Development with React and Redux by Alex Banks, Eve Porcello · 2017

## CYBER SECURITY AND FORENSIC

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST651	3:0:0:0	03	CIE:50 SEE:100	03 Hours	PEC

### Course Objectives:

This course will enable students to,

- Realize the fundamental concepts of cyber security and to get awareness of cyber-attack.
- Create insight on cybercrime and offenses in digital world
- Get knowledge on Cyber forensic techniques and procedures
- Learn Cyber Defense and Analysis Techniques

### Module–I

**Cyber Security:** Network and Security Concepts, Information Assurance Fundamentals, Basic Cryptography, Symmetric Encryption, Public Key Encryption, RSA, the Domain Name System (DNS), Firewalls.

**08 Hours**

### Module– II

**Cyber Attack:** Attacker Techniques and Motivations, different Types of attacks, Anti-forensics, Fraud Techniques, code, threat Infrastructure. Malicious Code: Self-Replicating Malicious Code, Stealing Information and Exploitation, Form Grabbing, Browser Helper Objects.

**08 Hours**

### Module– III

**Cyber Crime:** Introduction, Cybercrime: Definition and Origins of the Word, who are Cybercriminals? Classification of Cybercrimes. Cyber offenses: How Criminals Plan them? Introduction, Categories of Cyber-crime, how Criminals Plan the Attacks, Social Engineering.

**08 Hours**

### Module – IV

**Cyber Forensic:** Understanding Computer Forensics, Introduction to Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-mail, Digital Forensics Life Cycle. Cyber Defense and Analysis: Defense and Analysis Techniques, Memory Forensics, Honeypots, Malicious Code Naming, Automated Malicious Code Analysis Systems, Intrusion Detection Systems, Case studies, Demonstration of forensic software and tool.

**08 Hours**

**Course Outcomes:**

On completion of this course, the students will be able to,

- CO1:** Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.
- CO2:** Analyze the cyber vulnerabilities and techniques used by hackers to create frauds.
- CO3:** Diagnose and investigate cyber-attacks related to computer systems and the digital world
- CO4:** Analyze and compare various types of cybercrime to Interpret and forensically investigate security incidents.
- CO5:** To deploy cyber defense techniques and can analyze the system for better forensic solutions

**Textbooks:**

- 1) James Graham, Richard Howard, Ryan Olson- Cyber Security Essentials CRC Press, ISBN 9780815351429, Published December14,2010, by Auerbach Publications.
- 2) Sunit Belapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, ComputerForensics and Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81-265-21791, PublishDate2013.

**References:**

- 1) MarjieT.Britz-Computer Forensics and Cyber Crime: An Introduction–Pearson.
- 2) Kimberly Graves "Official Certified Ethical Hacker Review Guide", ISBN-13:978-0-7821-4437-6, WileyPublishing,Inc.2015.
- 3) Chwan-Hwa (John) Wu,J. David Irwin - Introduction to Computer Networks and Cybersecurity -CRCPress.

**E-Resources:**

- 1) <https://www.hacker101.com/>
- 2) <https://blog.elearnsecurity.com/free-resources-to-legally-practice-ethical-hacking.html>
- 3) <https://www.routledge.com/Cyber-Security-Essentials/Graham-Olson-Howard/p/book/9781439851234>
- 4) <https://doc.lagout.org/security/ceh-official-certified-ethical-hacker-review-guide-exam-312-50.9780782144376.27422.pdf>
- 5) <https://www.pdfdrive.com/ethical-hacking-and-penetration-testing-guide-e18776556.html>
- 6) [https://heimdalsecurity.com/pdf/cyber\\_security\\_for\\_beginners\\_ebook.pdf](https://heimdalsecurity.com/pdf/cyber_security_for_beginners_ebook.pdf)

## INFORMATION & NETWORK SECURITY

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CST652	3 : 0 : 0 : 0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

As a student will be able to learn:

- Acquire the knowledge of basic concepts of cryptography and network security and classify attacks on a network.
- Understand and analyze the different process for hiding the information with conventional cryptographic algorithms.
- Comprehend various block cipher cryptosystems.
- Learn the concepts of public cryptosystems and key management Systems.
- Understand and apply authentication techniques to provide secure communication.

### Prerequisites:

Students should have the knowledge of Computer Networks, Mathematics and Algorithm Concepts.

### Module – I

**Introduction:** Service mechanisms and attacks, The OSI security architecture, A Model for Network Security.

**Symmetric Ciphers:** Symmetric cipher model, substitution techniques.

**08 Hours**

### Module – II

**Symmetric Ciphers:** Transposition techniques, Steganography. **Block Ciphers and DES:** Simplified DES. Block cipher principles, DES, Strength of DES, Block cipher design principles.

**08 Hours**

### Module – III

**Advanced Encryption Standard – AES Transformation Function:** Cipher-Substitute Bytes Transformation, Shift Row Transformation, Mix Column Transformation, Add Round Key Transformation, AES key expansion. Block cipher modes of operation.

**08 Hours**

### Module – IV

**Asymmetric Ciphers - Public key cryptography and RSA:** Principles of public key cryptosystems, RSA algorithm. **Other public key cryptosystems and key management:** Key management, Diffie-Hellman key exchange. Elliptic Curve Cryptography.

**08 Hours**

**Module – V**

**Network Security Applications - Authentication Applications:** X.509 Authentication Service, Kerberos.  
**Electronic Mail Security:** PGP.

**08 Hours****Course Outcomes:**

At the end of this course, students will be able to

- CO1:** Describe the basic concepts of cryptography and network security and classify attacks on a network, symmetric ciphers and substitution techniques.
- CO2:** Apply and integrate the different process for hiding the information with conventional cryptographic algorithms, transposition techniques and block ciphers.
- CO3:** Illustrate the various block cipher cryptosystems like DES and AES.
- CO4:** Analyze public cryptosystems and key management systems
- CO5:** Demonstrate and analyze authentication techniques to provide secure communication.

**Textbooks:**

- 1) Cryptography and Network Security: William Stallings, Pearson Education, 2003
- 2) Behrouz A Forouzan, Debdeep Mukhopadhyay: Cryptography and Network Security, 2nd Edition, Special Indian edition, Tata McGraw-Hill, 2011.

**Reference Books:**

- 1) Cryptography and Network Security, Atul Kahate, TMH, 2003

**Reference Online Resources:**

- 1) <https://nptel.ac.in/course.php>

## BLOCKCHAIN & CRYPTO

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CST653	3 : 0 : 0 : 0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

This course will enable students to:

- Understand about Symmetric and Asymmetric Encryption, block chain and Bit coin concepts
- Analyze the Working of Block Chain System.
- Design, build, and deploy smart contracts and distributed applications
- Evaluate security, privacy, and efficiency of a given block chain system.
- Cognize about ‘digital’ currency, Storage and Currency Exchange Services.

**Prerequisite:** Network Security and Information Security.

### Module – I

**Introduction to Block chain:** Back story of Block chain, what is Block chain? Centralized vs. Decentralized Systems, Layers of Block chain, why is Block chain Important? Limitations of Centralized Systems, Block chain Adoption So Far, Block chain Uses and Use Cases How Block chain Works: Laying the Block chain Foundation, Cryptography, Symmetric Key Cryptography, Cryptographic Hash Functions.

**08 Hours**

### Module – II

**Cryptography and Transactions:** Asymmetric Key Cryptography, Diffie-Hellman Key Exchange, Symmetric vs. Asymmetric Key Cryptography, Merkle Trees, Putting It All Together, Properties of Block chain Solutions, Block chain Transactions, Distributed Consensus Mechanisms, Block chain Applications, Scaling Block chain, Off-Chain Computation, Sharing Block chain State.

**08 Hours**

### Module-III

**Bitcoin Works:** The History of Money, Dawn of Bitcoin, What Is Bitcoin? Working with Bit coins, The Bit coin Block chain, Block Structure, The Genesis Block, The Bitcoin Network, Network Discovery for a New Node, Bitcoin Transactions, Consensus and Block Mining, Block Propagation, Bitcoin Scripts, Bitcoin Transactions Revisited, Scripts.

**08 Hours**

### Module – IV

**Ethereum:** How Ethereum works from Ethereum to Bitcoin, Ethereum as Next-Gen Block chain, Design Philosophy, Ethereum Blockchain, Ethereum Accounts and Ethereum Smart Contracts, EVM and Code Execution, Ethereum Ecosystems- Swarm, DApp.

**08 Hours**

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**Module – V**

**Crypto Currencies:** A Simple Crypto currency, Simple Local Storage, Hot and Cold Storage, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets.

**08 Hours**

**Course Outcomes:**

After the completion of this course, student will be able to

- CO1:** Gain Knowledge in Symmetric Encryption, Asymmetric Encryption, Block Chain System and Crypto currencies.
- CO2:** Analyze the working of Block Chain System, Ledger Transaction and Mining mechanism.
- CO3:** Design and Implement Ethereum block chain contract.
- CO4:** Pertain to ethical and legal usage of Block chain applications.
- CO5:** Use of Bit coins, online wallets, Currency Exchanges and payment services.

**Text Books:**

- 1) Bikram Aditya Singhal, Gautam Dhameja and Priyansu Sekhar Panda, "Beginning Block chain: A Beginner's Guide to Building Block chain Solutions", Apress publication, 2018.
- 2) Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bit coin and Crypto-currency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

**Reference Books:**

- 1) Mastering Bit coin by Andreas M. Antonopoulos
- 2) Block chain Technology: Crypto-currency and Applications by S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press 2019.

**E-Resources:**

- 1) NPTEL online course: <https://nptel.ac.in/courses/106/104/106104220/#>
- 2) Udemy: <https://www.udemy.com/course/build-your-blockchain-az/>
- 3) EDUXLABS Online training: <https://eduxlabs.com/courses/blockchaintechnology-training/?tab=tab-curriculum>

## ANIMATION & GAME DEVELOPMENT

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CST661	3 : 0 : 0 : 0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

- Understand the basics of animation and game theory
- Demonstrate the principles of animations and operations
- Explain 2D animation techniques
- Describing and Solving Game theory problems
- Demonstrate applications of the Game Designs

**Pre-requisite:** Fine art or Graphic arts and Ability to use Animation and video editing software.

### Module- I

**Basics of Animations- Development:** Idea Creation, Evolving a Storyline. **Character Design:** The Evolution of 2D Character Design, The Evolution of 3D Character Design, Animation Style, Concept and Environment Design. **Project Financing:** Animation Markets, Scheduling and Budgeting, Investment, Marketing, and Distribution Possibilities.

**08 Hours**

### Module – II

**Principles of Animation:** Key Poses, Breakdowns, and In between, Timing, Extreme Positions, Arcs and Paths of Action, Holds, Emphasis, Anticipation, Weight and Weighted Movement, Flexibility and Fluid Joint Movement, Overlapping Action, Generic Walks, Walk Cycles, Runs and Run Cycles, Silhouetting, Dialogue and Lip Sync, Laughter, Takes, Eyes and Expressions.

**08 Hours**

### Module – III

**2D Animation Overview:** It's All about Pencils and Paper Script, The Tools of the Trade. **2D Animation Basics:** Keys, In-betweens, and Timing, Dope (Exposure) Sheets and Production Folders, Flipping and Peg Bars, Using Peg Bars

**08 Hours**

### Module - IV

**Introduction to Game theory:** A Model of Games, The Game Half, The Player Half, The ThirdHalf, Rules and Structure, Emotions and Feelings, Immersive, Real World to Game World, Game Systems, Probability, Graphical Interface

**08 Hours**

**Module - V**

**GAME PROGRAMMING:** Overview, Programming Teams, Methodologies, Common Practices, Quality, Leveraging Existing Code, Platforms.

**08 Hours****Course Outcomes**

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

- CO1:** Understand the Basics of Animation techniques.
- CO2:** Describe principles animation techniques.
- CO3:** Demonstrate the functions of 2D Animation techniques.
- CO4:** Apply game theory in real-time animated projects.
- CO5:** Apply the models of the Game theory problems

**Textbooks:**

- 1) Animation from Pencil to Pixels, Tony White, Classical Techniques for Digital Animators, Focal Press is an imprint of Elsevier.
- 2) Introduction to Game Development by Steve Rabin 2<sup>nd</sup> Edition.

**Reference Books:**

- 1) Sketching for Beginners: Step-by-step Guide to Getting Started with Your Drawing
- 2) Perspective Made Easy (Dover Art Instruction)
- 3) Roger B Myerson: Game theory: Analysis of Conflict, Harvard University Press, 1997
- 4) An Introduction to Game Theory: Strategy, Joel Watson, W W Norton and Company.

**E-Resources:**

- 1) <https://web.cse.ohio-state.edu/~wang.3602/courses/cse3541-2017-fall/>

## DEVOPS

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CST662	3 : 0 : 0 : 0	03	CIE:50 SEE:50	03 Hours	PCC

### Course objectives:

This course will enable students to:

- Understand the DevOps Concepts and DevOps Tool.
- Expose to the evolving Applications and advance features of Jenkins and Docker.
- Get Familiarize with Docker and Chef workstations.
- Understand the importance of testing using Jenkins, AWS EC2.
- Identify and understand security in Jenkins and monitor the azure Applications.

### Module – I

**Introduction to DevOps Concepts:** Understanding DevOps movement, DevOps with changing times, The waterfall model, Agile Model, Why DevOps? , DevOps lifecycle, Benefits of DevOps.

**08 Hours**

### Module – II

**Continuous Integration with Jenkins 2:** Introduction, Installing Jenkins, Jenkins dashboard, Configuration Java, Maven/Ant in Jenkins, Creating and Configuring build job for Java application with Maven, Managing Nodes, Email notifications based on build status.

**08 Hours**

### Module – III

**Containers:** Overview of Docker containers, Understanding the difference between virtual machines and containers, Installing and configuring Docker, Creating a Tomcat container. **Cloud Computing and Configuration Management:** An overview of the Chef configuration management tool, Installing and configuring a Chef workstation, Installing knife plugins for Amazon Web Services and Microsoft Azure.

**08 Hours**

### Module – IV

**Automated Testing (Functional and Load Testing):** Functional testing using Selenium, Functional test execution in Jenkins, Load test execution using Jenkins. **Orchestration - End-to- End Automation:** End-to-end automation of application life cycle management using Jenkins, End-to-end automation using Jenkins, Chef, and AWS EC2, End-to-end automation using Jenkins and AWS Elastic Beanstalk, End-to-end automation using Jenkins and Microsoft Azure app services, End-to-end automation orchestration of application life cycle Management using VSTS.

**08 Hours**

## Module – V

**Security and Monitoring:** Security in Jenkins and VSTS, Security in Jenkins and VSTS, Monitoring Jenkins and Microsoft Azure, Monitoring Jenkins, Azure Web Apps troubleshooting and monitoring, Azure App Services - CPU and memory consumption, Azure App Services - Activity log, Azure Application Insights for application monitoring, Azure web application monitoring, Diagnostics logs.

**08 Hours**

### Lab Programs:

- 1) Download and install Jenkins CI on GCP.
- 2) Configuration. Change language interface and Create the first Jenkins job
- 3) Build Triggers, cron syntax, Artifacts.
- 4) Create and run Jenkins pipeline.
- 5) Create parameterized jobs in Jenkins.
- 6) Install and configure Docker.

### Course outcomes:

On completion of this course, the students are able to:

**CO1:** Understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements

**CO2:** Build jobs and configurations in Jenkins and Master in docker, Continuous Delivery and chef Configuration Management.

**CO3:** Create tomcat container and work on Dockers and chef workstation.

**CO4:** Analyze, design and evaluate automation scripts & systems.

**CO5:** Use Azure application services and monitor the security issues in Jenkins and Microsoft Azure.

### Textbooks:

- 1) Mitesh Soni: DevOps for Web Development, Packet Publishing, ISBN: 9781786465702, Released October 2016
- 2) Mitesh Soni: DevOps Bootcamp-A fast-paced guide to implement DevOps with ease, May 2017 (Chapters: 3,4,6,7,8), ISBN 978-1-78728-596-5.

### Reference Books:

- 1) Len Bass, Ingo Weber, Liming Zhu, Devops Software Architect's perspective, first edition, ISBN 978-0-13-404984-7, 2015 Pearson Education, Inc.
- 2) Trevor Roberts, Jr., Josh Atwell, Egle Sigler, Yvo van Doorn, Devops for VMware Administrator, First Printing: April 2015, ISBN-10: 0-13-384647-4, ISBN-13: 978-0-13-384647-8, Pearson Education, Inc.
- 3) Sanjeev Sharma "The DevOps Adoption Playbook: A Guide to Adopting DevOps in a Multi-Speed IT Enterprise" Published by John Wiley & Sons, Inc. ISBN: 978-1-119-30874-4, ISBN: 978-1-119-31052-5 (eBook), ISBN: 978-1-119-31076-1 (eBook)

## **E-Recourses**

- 1) <https://resources.collab.net/devops-101/what-is-devops>.
- 2) <https://www.ibm.com/cloud/learn/devops-a-complete-guide>.
- 3) <https://newrelic.com/devops/what-is-devops>
- 4) <https://www.oreilly.com/library/view/devops-for-web/9781786465702/>

## MACHINE LEARNING

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19CST663	3 : 0 : 0 : 0	03	CIE:50 SEE:50	03 Hours	PCC

### Course Objectives:

This course will enable students to:

- Understand the basic concepts and techniques of Machine Learning.
- Understand decision tree algorithms and classify supervised, unsupervised and reinforcement learning algorithms.
- Learn Artificial Neural Networks with multilayer perceptron's.
- Understand algorithms for learning Bayesian networks.
- Gain knowledge on probability learning theory.

**Prerequisite:** Basic Knowledge of Mathematics, Computer skills with programming and learning abilities

### Module – I

**Introduction:** Well-Posed Learning problems, Designing a learning system, Perspectives and issues in machine learning.

**08 Hours**

### Module – II

**Decision Tree Learning:** Introduction, Decision Tree representation, Appropriate problems for decision tree learning, The basic decision tree algorithm, Hypothesis space search in decision tree algorithms, Inductive bias in decision tree learning, Issues in decision tree learning.

**08 Hours**

### Module – III

**Artificial Neural Networks:** Introduction, Neural network representation, Problems for neural network learning, Perceptron's, Multiple layer networks and back propagation algorithm. An illustrative example: Face recognition.

**08 Hours**

### Module – IV

**Evaluating Hypotheses and Bayesian Learning:** Motivation, estimating hypothesis accuracy, Basics of sampling theory, Bayes theorem and concept learning, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example: Learning to classify text.

**08 Hours**

### Module – V

**Computational Learning Theory:** Introduction, probably learning an approximately correct hypothesis, the mistake bound model of learning.

**08 Hours**

**Course Outcomes:**

On completion of this course, the students are able to:

**CO1:** Choose the learning techniques and investigate concept learning.

**CO2:** Identify the characteristics of decision tree and solve problems associated with Machine Learning.

**CO3:** Apply effectively neural networks for appropriate applications.

**CO4:** Apply Bayesian techniques and derive effectively learning rules.

**CO5:** Evaluate hypothesis and investigate instant based learning and reinforced learning.

**Textbooks:**

- 1) Tom M Mitchell, "Machine Learning", McGraw-Hill

**Reference Books:**

- 1) Aaron Courville, Ian Goodfellow, and Yoshua Bengio, Deep Learning, MIT Press, 2015, ISBN 9780262035613
- 2) Christopher Bishop, Pattern recognition and machine learning. Himalaya Publishing House ISBN: 98345789
- 3) Course material available on Swayam platform and NPTEL, for the course on Introduction to Machine Learning, conducted by Prof. Sudeshna Sarkar, IIT Kharagpur.
- 4) Ethem Alpaydın, Introduction to Machine Learning, MIT press 4<sup>th</sup> edition ISBN 9780262043793.
- 5) C Agarwal, Machine Learning for Text, Pearson Education - 2006 (2 & 4). ISBN –15:34519801.

## EMPLOYABILITY SKILLS AND TECHNICAL APTITUDE

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19PET691	0:0:4:0	03	CIE:50 SEE:50	03 Hours	PT

### Course Objectives:

This course will enable students to:

- Understand C, C++ Java and Data Structure.
- Improves program abilities to think on a particular given topic
- Anticipate interview questions according to job requirement.

### Module – I

**C Programming:** C Introduction - Decision and Loops - C Functions - Arrays and Strings - C Pointers - Structure & Union - C Files I/O - C Programs

**12 Hours**

### Module – II

**C++:** C++ Overview - Functions and Variables - Classes in C++ - Input and Output in C++ Programs

**06 Hours**

### Module – III

**Data Structures:** Basic Concepts - Arrays and Structures - Stacks and Queues - Linked Lists – Trees - Priority Queues

**06 Hours**

### Module – IV

**JAVA Basics:** OOPS - Java Language Fundamentals - Java Virtual Machine - Java Run Time Environment - SQL Queries - Basics of Designing - Web Programming. **Operating Systems** - Introduction to OS - Process Management – Deadlocks - File System - Secondary Storage Structures.

**09 Hours**

### Module – V

**DBMS:** Introduction - Entity Relationship Model - Relational Model and Relational Algebra - Database Design - Transaction Management . **Networking** - Network concepts - Network architectures - The OSI model - Wired Network Connections - Network Interface cards and modems -LAN wiring - The TCP/IP protocol suite.

**06 Hours**

**Course Outcomes:**

- CO1:** Explain the object-oriented concepts and JAVA.
- CO2:** Develop computer programs to solve real world problems in Java.
- CO3:** Develop simple GUI interfaces for a computer program to interact with users

**Text Books:**

1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

**Reference Books:**

1. Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education, 2008, ISBN:9788131720806.
2. Rajkumar Buyya, S Thamarasi selvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
3. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.
4. Anita Seth and B L Juneja, JAVA One step Ahead, Oxford University Press, 2017.

## ENVIRONMENTAL STUDIES

Course Code	L : T : P : S	Credits	Exam Marks	Exam Duration	Course Type
19ENV67	1 : 0 : 0 : 0	01	CIE:50 SEE:50	03 Hours	HSMC

**Course Objectives:** To recognize major concepts in environmental sciences and demonstrate in-depth understanding of the environment. The industrial revolution and development have led to the stress on environment in the form of pollution. Checking of the pollution in all fronts at local and global level encompassing the issues of carbon credit, ozone level depletion, global warming, desertification and polar ice cap melting. The main objectives of the course is to expose to students to the problems and mitigation measures concerned to the environmental components like resources, air, water and land.

### Module-I

**Ecosystems** (Structure and Function): Forest, Desert, Wetlands, Riverine, Oceanic and Lake.

**Biodiversity:** Types, Value; Hot-spots; Threats and Conservation of biodiversity, Forest Wealth, and Deforestation.

**03 Hours**

### Module-II

**Advances in Energy Systems** (Merits, Demerits, Global Status and Applications): Hydrogen, Solar, OTEC, Tidal and Wind.

**Natural Resource Management** (Concept and case-studies): Disaster Management, Sustainable Mining, Cloud Seeding, and Carbon Trading.

**03 Hours**

### Module-III

**Environmental Pollution** (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, Case-studies): Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution.

**Waste Management & Public Health Aspects:** Bio-medical Wastes; Solid waste; Hazardous wastes; Ewastes; Industrial and Municipal Sludge.

**03 Hours**

### Module-IV

**Global Environmental Concerns** (Concept, policies and case-studies): Ground water depletion/recharging, Climate Change; Acid Rain; Ozone Depletion; Radon and Fluoride problem in drinkingwater; Resettlement and rehabilitation of people, Environmental Toxicology.

**03 Hours**

### Module-V

**Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications):**

G.I.S. & Remote Sensing, Environment Impact Assessment, Environmental Management Systems, ISO14001;

Environmental Stewardship- NGOs.

**Field work:** Visit to an Environmental Engineering Laboratory or Green Building; Visit to a local area to document environment assets river / forest / grassland / hill / mountain. Visit to a local polluted site-urban/rural/industrial/agricultural/Water Treatment Plant/ Waste water treatment Plant. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hills slopes; etc (field work equal to 2 lecture works) ought to be followed by understanding of process and its brief documentation.

**03 Hours**

### Course Outcomes:

At the end of the course, students will be able to: .

- CO1:** Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale, .
- CO2:** Develop critical thinking and/or observation skills and apply them to the analysis of a problem or question related to the environment.
- CO3:** Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
- CO4:** Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

### Text Books:

1. Benny Joseph: "Environmental Studies". Tata Mc Graw – Hill, 2<sup>nd</sup> Edition, 2012.
2. S M Prakash: "Environmental Studies", Pristine Publishing House, Mangalore, 3<sup>rd</sup> Edition, 2018.
3. R Rajagopalan: "Environmental Studies – From Crisis to Cure: Oxford Publisher, 2005.
4. R. Geetha Balakrishna, and K. G. Lakshminarayana Bhatta: "Environmental Studies", SM Publications, 2016.

### Reference Books:

1. Raman Sivakumar: "Principals of Environmental Science and Engineering", Cengage learning, Singapur, 2nd Edition, 2005.
2. M.Ayi Reddy Textbook of environmental science and Technology, BS publications 2007.
3. Dr. B.S Chauhan, Environmental studies, university of science press 1st edition.

### E-Resources

<https://youtu.be/tqgo6PYfJLk?si=dd82TkdFKTu8D-zB>

# **VII Semester**

## **Course Syllabus**

## Advanced Cloud Computing (Amazon Web Services)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI71	3:0:2:0	04	CIE:50 SEE:50	03 Hours	PEC - IV

### Course Objectives:

This course will enable students to:

- Identify the security and compliance benefits of by using the AWS Cloud.
- Understand the access control and management features of AWS.
- Learn about data encryption methods to secure all types of sensitive data.
- Get knowledge about the important steps for managing various AWS resources.
- Study the AWS services to protect network security.

### Module–I

**Introduction to AWS:** AWS history, AWS Infrastructure, AWS services, AWS ecosystem **Programming, management console and storage on AWS:** Basic Understanding APIs - AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Elasticblock store - Simple storage service(S3), Glacier - Content delivery platforms.

**08 Hours**

### Module–II

**AWS identity services, security and compliance:** Users, groups, and roles - Understanding credentials, Security policies, IAM abilities and limitations, AWS physical security - AWS compliance initiatives, Understanding public/private keys, Other AWS security capabilities.

**08 Hours**

### Module–III

**AWS computing and marketplace:** Elastic cloud compute (EC2) - Introduction to servers, Imaging computers, Auto scaling, elastic load balancing, cataloging the marketplace, AMIs, Selling on the marketplace. **AWS networking and databases:** Virtual private clouds, Cloud models, Private DNS servers (Route 53), Relational database service – Dynamo DB, ElastiCache, Redshift.

**08 Hours**

### Module–IV

**Other AWS services and management services:** Analytics services, Application services, Cloud security, Cloud Watch, Cloud Formation, Cloud Trail, OpsWorks. **Configuration management:** Introduction.

**08 Hours**

### Module–V

**AWS billing and Dealing with disaster:** Managing costs, Utilization and tracking, Bottom line impact, Geographic and other concerns, Failure plans, Examining logs.

**08 Hours**

**Course Outcomes:**

On completion of this course, the students will be able to:

- CO1:** Explain the similarities between General Cloud and AWS along with Economical and Billing Systems used for various services.
- CO2:** Develop AWS Global Infrastructure and Cloud Security Model.
- CO3:** Implement Networking, Content Delivery and AWS services such as EC2, Lambda, Elastic Beanstalk.
- CO4:** Use various Storages and Database services in AWS.
- CO5:** Demonstrate Cloud Architecture along with Auto Scaling and Monitoring.

**Textbooks:**

- 1) Barrie Sosinsky. John Wiley & Sons. Cloud Computing Bible. First Edition January 2011. ISBN-13: 978-0470903568.
- 2) Bernard Golden Amazon Web Services for Dummies. For Dummies publication; 1 edition (9 August 2013) ISBN-13: 978- 1118571835
- 3) Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition (3 January 2011). ISBN: 9780470887998

**Reference Books:**

- 1) Amazon.com Mashups by Francis Shanahan, Wrox, Wiley Publishing Inc., ISBN-13: 978-0470097779, ISBN-10: 0470097779
- 2) Amazon Web Services in Action by Michael Wittig and Andreas Wittig, Dreamtech Press, ISBN: 9789351198758
- 3) Building Applications in the Cloud: Concepts, Patterns and Projects by Christopher M. Moyer, Pearson Addison-Wesley Professional, ISBN-10: 0321720202, ISBN-13: 978-0321720207
- 4) Cloud Computing Design Patterns by Thomas Erl, Prentice Hall, ISBN-10: 0133858561, ISBN-13: 978-0133858563

**E-Resources**

- 1) Amazon Security overview whitepaper- <https://aws.amazon.com/whitepapers>
- 2) I AM Getting started Guide <http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html>

## UML & AGILE PRACTICES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI72	3:0:2:0	04	CIE:50 SEE:50	03 Hours	PEC - IV

### Course Objectives:

This course will enable students to:

- Understand the basic concepts of Object Orientation and UML.
- Get a clear understanding of how to use UML and design diagrams.
- Know iterative, incremental and development process.
- Study the principles and practices of extreme programming.
- Understand the essence of agile development methods and develop prototyping in the software process.

### Module – I

**UML Diagrams:** What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modelling history. UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams.

**08 Hours**

### Module – II

**Advanced Modelling and Design:** System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams derived data; Packages; Practical tips. State Modelling, Advanced: Events, States, Transitions and Conditions; State diagrams; State diagram behavior nested states signal generalization concurrency; Relation of class and state models.

**08 Hours**

### Module – III

**The Agile Movement** - A Five Minute Primer, what is Agile Development? The Agile Methodologies Agile Values, Agile Practices, Agile Principles. **Agile Characteristics-** The Characteristics of an Agile Project, The Development Team Project Management, The Customer, Processes and Tools The Contract, What Projects Can Benefit from Agile Development.

**08 Hours**

### Module – IV

**The Agile Methodologies:** Common Themes, Methodology Descriptions, Extreme Programming, Scrum, Feature Driven Development, The Crystal Methodologies, Adaptive Software Development, Dynamic Systems Development Method, Lean Software Development, Starting Monday: Investigate Further.

**Selecting an Approach that Fits:** Choosing between an Agile or Traditional Approach, Selecting the Right Agile Approach.

**08 Hours**

## Module – V

**Agile Practices and Testing:** Getting Started, Agile Practices Explained, Selecting the Next Practice, Rejecting a Practice, Adopt Practices before Tools Learn Programming Practices in Pairs, Agile Practices in this Book Agile Practices Explained, Why these Practices were Chosen, An Agile Approach to Testing, The Good Enough Approach Testing as the Best Défense.

**08 Hours**

### Course Outcomes:

On completion of this course, the students will be able to:

**CO1:** Use the basic concepts of object orientation, analyze and design object-oriented system using UML.

**CO2:** Describe the advanced UML analysis and design diagrams.

**CO3:** Apply the common characteristics of an agile development process.

**CO4:** Analyze agile software development process models and plan driven process models.

**CO5:** Determine software project characteristics that would be suitable for an agile process

### Textbooks:

- 1) Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005. (module 1 and 2), ISBN-13: 9781584509876
- 2) Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005. (module 1 and 2), ISBN-13: 9781584509876
- 3) Ken Schwaber and Mike Beedle, Agile Software Development With Scrum, Pearson Education, 2015. ISBN-13: 9780132074896
- 4) Peter Schuh, Integrating Agile Development In The Real World (Charles River Media Programming), 2004 Cengage Learning, ISBN-13: 9781584503644

### Reference Books:

1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
2. Alistair Cockburn, Agile Software Development: The Cooperative Game, Pearson Education, 2015. ISBN-13: 9780321482754
3. Mike Cohn, Succeeding With Agile: Software Development Using Scrum, Pearson Education Limited, 2016, ISBN-13: 9789332547964

### E Resources:

- 1) <https://www.gurock.com/testrail/agile-testing?>
- 2) [https://cucumber.io/tools/cucumberstudio/?utm\\_source](https://cucumber.io/tools/cucumberstudio/?utm_source)

# **Professional Elective-I**

## ROBOTICS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI731	3:0:0:0	03	CIE:50 SEE:50	03 Hours	PE-I

### Course objectives:

This course will enable students to:

- Understand the basics of robotics & its simulation.
- Study working of actuators & encoders.
- Learn ability to use software tools for working with sensors.
- Exposed to Robot Operating System.
- Acquire the knowledge of automation in various sources.

### Module – I

**BASICS OF ROBOTICS:** History – Definition – Components – Building a robot – The Robot drive mechanism. **ROBOT SIMULATION:** Mathematical modeling of the robot - Robot kinematics - Concepts of ROS and Gazebo.

**08 Hours**

### Module – II

**DESIGNING CHEFBOT HARDWARE:** Specifications - Block diagram -Working with Robotic Actuators and Wheel Encoders - Interfacing DC geared motor with Tiva C Launch Pad - Interfacing quadrature encoder with Tiva C Launch pad - Working with Dynamixel actuators.

**08 Hours**

### Module – III

**WORKING WITH ROBOTIC SENSORS:** Working with ultrasonic distance sensors - Working with the IR proximity sensor - Working with Inertial Measurement Unit.

**08 Hours**

### Module – IV

**PYTHON AND ROS:** Introduction to OpenCV, OpenNI, and PCL - Programming Kinect with Python using ROS, OpenCV, and OpenNI - Working with Point Clouds using Kinect, ROS, OpenNI, and PCL.

**08 Hours**

### Module – V

**INTERFACING IT INTO ROS, USING PYTHON:** Building ChefBot hardware - Writing a ROS Python driver for ChefBot - Understanding ChefBot ROS launch files - Working with ChefBot Python nodes and launch files - The Calibration and Testing of ChefBot - The Calibration of Xbox Kinect using ROS - Wheel odometry calibration - Testing of the robot using GUI.

**08 Hours**

**Course Outcomes:**

On completion of this course, the students are able to:

**CO1:** Explain the concept of robotics & simulating it.

**CO2:** Develop simple robot models.

**CO3:** Deploy various sensors for effective use.

**CO4:** Use Robot Operating system effectively.

**CO5:** Demonstrate some simple robotic applications.

**Textbooks:**

- 1) Lentin Joseph, "Learning Robotics using Python", PACKT Publishing, 2015, ISBN: 978- 1783287536.
- 2) Aaron Martinez and Enrique Fernandez," Learning ROS for Robotics Programming", PACKT Publishing, 2013, ISBN: 9781782161455.

**Reference Books:**

- 1) Bill Smart, Brian Gerkey, Morgan Quigley," Programming Robots with ROS: A Practical Introduction to the Robot Operating System", O'Reilly Publishers, 2015,ISBN:978- 1449323899.

**E-Resources:**

- 1) <https://blog.oureducation.in/best-available-robotics-reference-books/>
- 2) <https://www.robotics.org/Robotic-Resources>

## AD-HOC NETWORKS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST732	3:0:0:0	03	CIE:50 SEE:50	03 hours	PE-I

### Course objectives:

This course will enable students to:

- Learn the mathematical models and network protocol designs in wireless multihop-networks.
- Understand exposition of network protocols and their cross-layer interactions.
- Learn the active research areas in wireless multichop networks.
- Gain knowledge on network protocols.
- Understand the importance of network security.

### Module – I

**Introduction Ad-hoc Networks:** Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless internet.

**08 Hours**

### Module – II

**MAC Protocols for Ad hoc wireless Networks:** Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols with reservation mechanisms.

**08 Hours**

### Module – III

**Routing -Routing protocols for Ad hoc wireless Networks:** Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table drive routing protocol, On-demand routing protocol. Hybrid routing protocol, routing protocols with effective flooding mechanisms.

**08 Hours**

### Module – IV

**Transport layer protocols for Ad hoc wireless Networks:** Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks, Other transport layer protocols for Ad hoc wireless Networks.

**08 Hours**

### Module – V

**Security:** Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Network security attacks, Key management, Secure routing in Ad hoc wireless Networks.

**08 Hours**

**Course Outcomes:**

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

- CO1:** Design their own wireless network.
- CO2:** Evaluate the existing network and improve its quality of service.
- CO3:** Choose appropriate protocol for various applications.
- CO4:** Examine security measures present at different level.
- CO5:** Analyze energy consumption and management.

**Textbook:**

- 1) C Shiva Rama Murthy and B. S Manoj: Ad Hoc Wireless networks, 2nd Edition, Pearson Education, 2005. ISBN 0-13-147023-X.
- 2) Jyoti Prakash Singh, Paramartha Dutta, Amlan Chakrabarti; Ad Hoc Networks: A Statistical Perspective Hardcover Springer; 1st ed. 2018 edition (13 April 2018) –ISBN-13: 978- 9811087691.

**Reference Book:**

- 1) Rahim Hekmat, Ad-hoc Networks: Fundamental Properties and Network Topologies Paperback, Springer; Softcover reprint of the original 1st ed. 2006 edition (30 April 2017) ISBN-10: 940177661X.
- 2) Prasant Mohapatra, Srikanth Krishnamurthy; AD HOC NETWORKS: Technologies and Protocols 2005th Edition, Springer; 2005 edition (September 23, 2004), ISBN- 10: 9780387226897.

**E-Resources:**

- 1) [https://www.webopedia.com/TERM/H/hybrid\\_routing\\_protocol.html](https://www.webopedia.com/TERM/H/hybrid_routing_protocol.html)
- 2) <https://www.cynet.com/cyber-attacks/network-attacks-and-network-security-threats/>

## PATTERN RECOGNITION AND ANOMALY DETECTION

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI733	3:0:0:0	03	CIE:50 SEE:50	03 Hours	PE-I

### Course Objectives:

This course will enable students to:

- Understand the mathematical morphology necessary for Pattern recognition.
- Introduce the student to various Pattern recognition techniques.
- Learn the Representation and description and feature extraction.
- Comprehend various anomaly detection approaches
- Recognize real world problems and applications related to pattern recognition & anomaly detection

### Module – I

**Introduction to Pattern Recognition and Anomaly Detection:** Definition of PR, Applications, Datasets for PR, Different paradigms for PR, Introduction to probability, events, random variables, Joint distributions and densities, moments. Estimation minimum risk estimators, problems.

**08 Hours**

### Module – II

**Statistical Approaches for Pattern Recognition:** Data structures for PR, Representation of clusters, proximity measures, size of patterns, Abstraction of Data set, Feature extraction, Feature selection, Evaluation.

**08 Hours**

### Module – III

**Machine Learning Approaches for Pattern Recognition:** Nearest neighbor algorithm, variants of NN algorithms use of NN for transaction databases, efficient algorithms, Data reduction, prototype selection, Bayes theorem, minimum error rate classifier, estimation of probabilities, estimation of probabilities, comparison with NNC, Naive Bayes classifier, Bayesian belief network.

**08 Hours**

### Module – IV

Anomaly Detection & Anomaly Detection Approaches: The different aspects of anomalies, Classification-based approaches, **Unsupervised Approaches:** Clustering, Nearest- neighbor, other statistical techniques, **Non-Standard Approaches:** Information-theoretic methods, Spectral techniques.

**08 Hours**

### Module– V

**Real-world problems:** Network intrusion detection: Types of cyber-attacks on networks, Network Anomaly Detection techniques, Anomaly Detection in BIG DATA: The nature of big data, Key challenges, relevant technologies, relevant approaches and examples.

**08 Hours**

## Lab Programs

Implement the programs on the following:

- 1) Feature Representation
- 2) Mean and Covariance
- 3) Linear Perceptron Learning
- 4) Generation of Random Variables
- 5) Bayesian Classification
- 6) MLE: Learning the classifier from data
- 7) Data Clustering: K-Means, MST-based

## Course Outcomes:

On completion of this course, the students are able to:

**CO1:** Illustrate pattern recognition fundamentals

**CO2:** Explain the advantages and disadvantages of various statistical methods for pattern recognition

**CO3:** Determine how to apply a supervised learning algorithm to a classification problem for anomaly detection

**CO4:** Explain the limitations of supervised learning for anomaly detection

**CO5:** Practice applying the various techniques to different problems in different domains

## Textbooks:

- 1) Pattern Recognition (An Introduction), V Susheela Devi, M Narsimha Murthy, Universities Press, ISBN 978-81-7371-725-3, 2011.
- 2) Pattern Recognition & Image Analysis, Earl Gose, Richard Johnson Baugh, Steve Jost. PHI ISBN-81-203-1484-0, 1996.
- 3) Statistical Pattern Recognition Second Edition, Andrew R. Webb QinetiQ Ltd., Malvern, UK, ISBN 0-470-84513-9, ISBN 0-470-84514-7.
- 4) Anomaly Detection Principles and Algorithms, Kishan G. Mehrotra, Chilukuri Mohan, Huaming Huang, Springer International Publishing, 2017, ISBN 978-3-319-67526-8

## References:

- 1) Duda R. O., P.E. Hart, D.G. Stork., Pattern Classification, John Wiley and sons, 2000.

## **Industry Elective-I**

## DECISION SUPPORT SYSTEMS (DSS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST741	3:0:0:0	03	CIE:50 SEE:50	03 Hours	IE - I

### Course objectives:

This course will enable students to:

- Identify among data processing systems, management information systems, and decision support/ expert systems
- Learn decision rules based on knowledge provided by an acknowledged expert and codify those rules as assertions, rules, and ad hoc procedures
- Outline the major components of Decision Support Systems (DSS)
- Learn how information is used to solve problems
- Utilize commercial spreadsheet and database integrated packages to develop
- Simulation models to support the decision-making process.

### Module – I

**Introduction to Decision Support Systems (DSS):** Different types of Managerial Decision Problems and the Role of a DSS in solving them. Management Information System versus DSS, Range of Capabilities of a DSS, Components of a DSS, Examples of DSS, Basics of DSS Design Cycle.

**08 Hours**

### Module – II

**Models in Decision Support Systems:** What is a Model? Classification of Models, Purpose of Modelling in DSS, Solution Techniques: Optimization, Heuristics, and Simulation, Traditional approach to modelling and its weaknesses, Desirable features for Models in DSS, Models and Managers: The Concept of a Decision Calculus’.

**08 Hours**

### Module – III

**Decision Support in Business:** Introduction, Decision Support Trends, Management Information Systems, Online Analytical Processing, Using Decision Support Systems, Executive Information Systems, Enterprise Portals and Decision Support, Knowledge Management Systems.

**08 Hours**

### Module – IV

**Data and Dialog Management Systems:** Database, Sources of Data, Data Directory, Data Structure and Database Languages, Query Facility, Data Management System, DBMS as DSS Development Tool. User Interface, Graphics, Multimedia, Visual Interactive Modelling Natural Language Processing.

**08 Hours**

### **Module -V**

**Development and Applications of DSS:** Development process, Software and Hardware and Data Acquisition, Model Acquisition, Dialog Development, Evaluation of Investment Proposals, Forecasting Demand for Independent Items, Determination of Product Mix, Vehicle Scheduling, Customer Centric Value Driven Decisions, Pricing Decisions.

**08 Hours**

#### **Course outcomes:**

On completion of this course, the students are able to:

**CO1:** Develop and implement DSS

**CO2:** Describe the decision-making process, the concepts and principles of a decision support system.

**CO3:** Identify decision support tools that can aid decision making.

**CO4:** Apply system development methodology to develop a decision support system.

**CO5:** Develop a functional prototype of a decision support system for a given case

#### **Textbooks:**

- 1) Peter G.W. Keen and Michael S. Scott Morton, 'Decision Support Systems: An Organizational Perspective' Addison-Wisely Publishing Company ISBN-9780201036671
- 2) Efraim turban and Jay E Aronson, 'Decision Support Systems and Intelligent Systems', Prentice Hall International, 1998, ISBN-9780130894656
- 3) Decision Support Systems: Concepts and Resources for Managers', Daniel J. Power, Greenwood Publishing Group, ISBN-9781567204

#### **References**

- 1) Mc Cosh, Andrew M, and Michael S. Scott Morton., "Management Decision Support Systems", The Mac Millan Press Limited, 1978, ISBN-10: 0333190394
- 2) Sprague, Ralf H., Carlson, Eric D., "Building Effective Decision Support Systems". Prentice Hall Inc., 1982, ISBN-978-0-13-086215-0
- 3) 'Decision Support and Data Warehouse systems by E.G. Mallach – Tata McGraw Hill ISBN-978007299818

#### **E-Resources:**

- 1) [www.docsity.com/en/decision-support-system](http://www.docsity.com/en/decision-support-system)
- 2) <http://web.fsktm.um.edu.my/~norjihan/wmes3302.html>

## ENTERPRISE RESOURCE PLANNING (ERP)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST742	3:0:0:0	03	CIE:50 SEE:50	03 Hours	IE - I

### Course Objectives:

This course will enable students to:

- Know contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.
- Focus on a strong emphasis upon practice of theory in Applications and Practical oriented approach.
- Train to learn the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.
- Aim at preparing technological competitive and make them ready to self-upgrade with the higher technical skills.
- Gain the knowledge of existing modules of ERP systems.

### Module-I

**Introduction to ERP:** Common ERP myths, Evolution of ERP, Advantages, Characteristics, Process integration with ERP system, Implementation costs, Roadmap for successful ERP implementation.

**ERP Market and Vendors:** ERP market, ERP vendors, Service oriented architecture, ERP package features.

**08 Hours**

### Module-II

**Extended ERP services:** Defining Extended ERP, Supply chain Management (SCM) and ERP, ERP and Business Intelligence (BI), ERP and E-commerce. **Business Process Re-engineering (BPR) and ERP:** Defining BPR, BPR Vs TQM, BPR and change management, approaches in BPR implementation, Methodologies for BPR implementation, BPR success/failure factors.

**08 Hours**

### Module-III

**Planning for ERP:** Planning for ERP implementation, understanding organizational requirement, Economic and strategic justification, Project scope, determining resources, organizational commitment to change, budget for ERP, select right ERP package. **Implementation of ERP:** Designs of ERP system, ERP implementation approach, ERP implementation life cycle, different phases of ERP implementation.

**08 Hours**

### Module-IV

**Managing ERP projects:** Risk/Failure factors in ERP implementation, Example of ERP failure, Critical success factors, Complexities of ERP projects, Evaluating ERP projects. **ERP: Going Live and post implementation:** Preparing to go live, Strategies for migration to new ERP system, Managing ERP after

Go Live, Maintenance of ERP system.

**08 Hours**

### **Module–V**

**ERP, Internet and WWW – ERP II:** The internet explosion, ERP, Internet and WWW, ERP to ERP II, Best practices of ERP II. **Future directions and Trends in ERP:** New markets, New channels, Easier communication tools, Business models, need based applications, Expenditures, Reduction in implementation time, Market snap shots, Shifting revenue models.

**08 Hours**

### **Course Outcomes:**

On completion of this course, the students will be able to:

**CO1:** Compare the concepts and importance of ERP system.

**CO2:** Design ERP market and vendors.

**CO3:** Differentiate the relationship of ERP and SCM.

**CO4:** Evaluate the concept ERP implementation.

**CO5:** Design the concepts of internet with respect to WWW.

### **Textbooks:**

- 1) Enterprise Resource Planning, Ashim Raj Singla, Cengage Learning India Pvt. Ltd., Second edition (1 July 2016) New Delhi, 2008. ISBN-No: 8131532046.
- 2) Enterprise Resource Planning, Alexis Leon, 2nd edition, Tata McGraw Hill Education Pvt.Ltd., New Delhi, 2008. ISBN-No: 1259005917.

### **Reference Books:**

- 1) E-Business and ERP: Transforming the Enterprise, Grant Norris, James R. Hurley, Kenneth M. Hartley, John R. Dunleavy, John D. Balls, John Wiley and Sons publications, 2000. ISBN- 10:0471392081.
- 2) Enterprise Resource Planning: Concepts and Practice, V.K. Garg. Second edition, PHI Learning Pvt. Ltd., Publications 2003 ISBN 8120322541.

### **E-Resources:**

- 1) <http://8thinktank.com/erp/erp-implementation-life-cycle/#:~:text=ERP%20Implementation%20Life%20Cycle%20is,%2C%20implementation%2C%20transition%20and%20operations>
- 2) [https://en.wikipedia.org/wiki/Enterprise\\_resource\\_planning](https://en.wikipedia.org/wiki/Enterprise_resource_planning)
- 3) <https://www.cio.com/article/2439502/what-is-erp-key-features-of-top-enterpriseresourceplanning-systems.html>

## SUPPLY CHAIN MANAGEMENT

Course Code	L: T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST743	3:0:0:0	03	CIE:50 SEE:50	03 Hours	IE - I

### Course Objectives:

This course will enable students to:

- Understand differences between logistics and supply chain management.
- Understand the framework of supply chain network.
- Learn about the components of inventory management.
- Understand the tools and techniques used in logistics management.
- Learn about the professional opportunities in supply chain management.

### Module – I

**Introduction:** Basic concepts & philosophy of SCM, essential features, decision phases –process view, supply chain framework, key issues in SCM and benefits.

**08 Hours**

### Module – II

**Designing the supply chain network:** Designing the distribution network, role of distribution, factors influencing distribution, design options, distribution networks in practice, network design in the supply chain, factors affecting the network design decisions. Designing and Planning Transportation Networks, role of transportation, modes, design options, tailored transportation.

**08 Hours**

### Module – III

**Inventory Management:** Concept, various costs associated with inventory, EOQ, buffer stock, lead time reduction, reorder point / re-order level fixation, ABC analysis, SDE/VED Analysis.

**08 Hours**

### Module – IV

**Inventory Management:** Concept, various costs associated with inventory, EOQ, buffer stock, lead time reduction, reorder point / re-order level fixation, ABC analysis, SDE/VED Analysis.

**08 Hours**

### Module – V

**Recent issues in SCM:** Role of computer/ IT in supply chain management, CRM Vs SCM, Benchmarking concept, features and implementation, outsourcing – basic concepts, value addition in SCM.

**08 Hours**

**Case study:**

- Students are expected to choose any 4 Indian Organizations and study their supply chain in terms of drivers of the Supply chain and submit a report.
- Students should visit different logistics companies and understand the services provided by them and submit a report.
- Students should identify the various types of IT applications employed by Indian Organizations in their Supply chain.

**Course Outcomes:**

On completion of this course, the students are able to:

**CO1:** Identify and Analyze Business Models, Business Strategies and, corresponding Competitive Advantage.

**CO2:** Formulate and implement supply chain management Best Practices

**CO3:** Analyze supply chain management and Logistics operations for optimum utilization of resources.

**CO4:** Evaluate cases for effective supply chain management and its implementation.

**CO5:** Demonstrate the risk and issues involved in supply chain management.

**Textbooks:**

- 1) Oyle, Bardi, Langley, A Logistic approach to Supply Chain Management –1<sup>st</sup> Edition, Cengage Learning, ISBN: 9781337415750.
- 2) Donald J Bowersox, Dand J Closs, M Bixby Coluper,
- 3) Supply Chain Logistics Management, 2<sup>nd</sup> Edition, TMH, 2008, ISBN 0-07- 1 1 23067.

**Reference Books:**

- 1) Chopra Sunil and Peter Meindl, Supply chain management, - 3rd editions, Pearson, 2007, ISBN 13:9780131730427.
- 2) Amith Sinha, Supply Chain Management-A Managerial Approach, Herbert, 2nd edition, TMH. ISBN: 9780071333436.
- 3) Agarwal D.K., A Text Book of Logistics and Supply chain management, - 1st edition, Macmillan. ISBN-13: 978-1403909954.

**E-Resources:**

- 1) <http://library.jgu.edu.in/content/logistics-and-supply-chain-management>
- 2) <https://ggu.libguides.com/supplychain>

## **Industry Elective-II**

## DIGITAL MARKETING (IE)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST751	3:0:0:0	03	CIE:50 SEE:50	03 Hours	IE - II

### Course Objectives:

This course will enable students to:

- Comprehend business advantages of digital marketing and its importance for marketing success and to develop a digital marketing plan.
- Learn Website and SEO optimization techniques and also, to outline Google AdWords campaigns.
- Acquire knowledge of Google Analytics for measuring effects of digital marketing and to get in sights of future trends that will affect the development of digital marketing.
- Learn to use various social media platforms in order to create, manage and evaluate digital marketing efficiently.
- Cognize strategies used for email marketing, resource planning and budgeting.

### Module – I

Introduction to digital marketing, Digital vs. Real Marketing, Digital Marketing Channels, Creating initial digital marketing plan, Content management, SWOT analysis, Target group analysis, Web design, Optimization of Web sites.

**08 Hours**

### Module – II

SEO Optimization, Writing the SEO content, Web design, Optimization of Web sites, Google Ad Words-creating accounts, Google AdWords- types, Introduction to CRM, CRM platform, CRM models, Introduction to Web analytics, Web analytics - levels.

**08 Hours**

### Module – III

Introduction of Social Media Marketing, creating a Facebook page, Visual identity of a Facebook page Types of publications, Business opportunities and Instagram options, Optimization of Instagram profiles, Integrating Instagram with a Web Site and other social networks, Keeping up with posts.

**08 Hours**

### Module – IV

Business tools on LinkedIn, creating campaigns on LinkedIn, analyzing visitation on LinkedIn, creating business accounts on YouTube, YouTube Advertising, YouTube Analytics, Facebook Ads, Creating Facebook Ads, Ads Visibility.

**08 Hours**

**Module – V**

E-mail marketing, E-mail marketing plan, E-mail marketing campaign analysis, Keeping up with conversions, Digital Marketing Budgeting- resource planning - cost estimating - cost budgeting – cost control.

**08 Hours**

**Course Outcomes:**

On completion of this course, the students are able to:

- CO1:** Examine the importance of digital marketing and create suitable plans for marketing success.
- CO2:** Assess customer relationships across all digital channels and build better customer relationships.
- CO3:** Create a digital marketing plan, starting from SWOT analysis and there by defining a target group.
- CO4:** Use social media channels to achieve maximum benefit for the business, by using web analytics.
- CO5:** Develop different ways for the integration of marketing plans taking into consideration the available resources and budget.

**Textbook:**

- 1) Damian Ryan & Calvin Jones, "Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation", Kogan Page Limited, 1st Edition, 2009, ISBN-978- 0749453893.

**Reference Books:**

- 1) Joe Pulizzi, "Epic Content Marketing", McGraw-Hill Education, 1<sup>st</sup> Edition 2013, ISBN-978-0071819893.
- 2) The Beginner's Guide to Digital Marketing (2015), Digital Marketer. (PDF)

**E-Resources:**

- 1) <https://www.digitalmarketer.com/digital-marketing/>
- 2) [https://www.tutorialspoint.com/digital\\_marketing/index.htm](https://www.tutorialspoint.com/digital_marketing/index.htm)
- 3) <https://www.javatpoint.com/digital-marketing>

## OPERATIONS RESEARCH

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST752	3:0:0:0	03	CIE:50 SEE:50	03 Hours	IE - II

### Course Objectives:

This course will enable students to:

- Learn quantitative methods and techniques for effective decision- making, model formulation and applications that are used in solving real world problems.
- Know the various techniques of OR, their applications and the relationship between a linear program and its dual.
- Learn different types of transportation and assignment models for optimization.
- Expose with techniques that are used to plan, schedule and monitor large projects such as building construction, maintenance of computer system, research and development design etc.
- Acquire knowledge on decision making techniques under conflicting situations where there are one or more opponents.

### Module – I

**Introduction, Linear Programming: Introduction:** The Origins, Nature and Impact of OR; Defining the Problem and Gathering Data; Formulating a Mathematical Model; Deriving Solutions from the Model; Testing the Model; Preparing to Apply the Model; Implementation. **Linear Programming:** Prototype Example; The Linear Programming Model; Assumptions of Linear Programming; Additional Examples.

**08 Hours**

### Module – II

**The Simplex Method:** The Essence of the Simplex Method; Setting Up the Simplex Method; The Algebra of the Simplex Method; The Simplex Method in Tabular Form; Tie Breaking in the Simplex Method; Adapting to Other Model Forms. **Duality Theory:** The Essence of Duality Theory; Primal- Dual Relationships; Adapting to Other Primal forms; The Dual Simplex Method.

**08 Hours**

### Module – III

**Transportation and Assignment Problems:** The transportation problem, Initial Basic Feasible Solution (IBFS) by North West Corner Rule method, Matrix Minima Method, Vogel's Approximation Method. Optimal solution by Modified Distribution Method (MODI). **The Assignment problem:** A Hungarian algorithm for the assignment problem. Minimization and Maximization varieties in transportation and assignment problems.

**08 Hours**

**Module – IV**

**Project Management with PERT/CPM:** A Prototype Example- The Reliable Construction Co. Project; Using a Network to Visually Display a Project; Scheduling a Project with PERT/CPM; Dealing with Uncertain Activity Durations; Considering Time-Cost Trade-Offs; Scheduling and Controlling Project Costs; An Evaluation of PERT/CPM.

**08 Hours****Module – V**

**Game Theory, Decision Analysis: Game Theory:** The Formulation of Two-Person, Zero-Sum Games; Solving Simple Games--A Prototype Example; Games with Mixed Strategies; Graphical Solution Procedure; Solving by Linear Programming; Extensions. **Decision Analysis:** A Prototype Example; Decision Making without Experimentation; Decision Making with Experimentation; Decision Trees.

**08 Hours****Course Outcomes:**

On completion of this course, the students will be able to:

**CO1:** Develop Linear Programming models, interpret the models, solutions and infer solutions to the real-world problems.

**CO2:** Explain optimization techniques for various problems.

**CO3:** Understand the given problem as transportation and assignment problem and solve.

**CO4:** Construct network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks.

**CO5:** Illustrate game theory for decision support system

**Textbooks:**

- 1) Frederick S. Hillier, Gerald J. Lieberman, Bodhibrata Nag, Preetam Basu: "Introduction to Operations Research", 9th Edition, Tata McGraw Hill, 2013, ISBN-13: 9780071333467.

**Reference Books:**

- 1) S D Sharma: "Operations Research", 18th Edition, Kedar Nath Ram Nath, 2017, ISBN-13: 9789380803388.
- 2) Hamdy A Taha: "Operations Research, An Introduction", 10th Edition, Pearson Education, 2017, ISBN-13: 9780134480220.

**E-Resources:**

- 1) [www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html](http://www.nptelvideos.in/2012/12/fundamentals-of-operations-research.html)  
[www.freevideos.com/courses/2678/advanced-operations-research](http://www.freevideos.com/courses/2678/advanced-operations-research)

**MANAGEMENT & ENTREPRENEURSHIP**

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST753	3:0:0:0	03	CIE:50 SEE:50	03 Hours	IE - II

**Course Objectives:**

This course will enable students to:

- Understand basic concepts in the area of management.
- Understand the role and importance of organizing and staffing
- Apply personal creativity in new venture as an entrepreneur.
- Analyze the key steps in elaboration of business idea.
- Create and analyze project with various advantages.

**Module – I**

**Management and Planning:** Management: Nature and Functions of Management – Importance, Definition, Management Functions, Levels of Management, Roles of Manager, Managerial Skills, Management & Administration, Management as a Science, Art & Profession. Planning: Planning-Nature, Importance, Types, Steps and Limitations of Planning; Decision Making – Meaning, Types and Steps in Decision Making.

**08 Hours****Module – II**

**Organizing and Staffing:** Organization-Meaning, Characteristics, Process of Organizing, Principles of Organizing, Span of Management (meaning and importance only), Departmentalization, Committees–Meaning, Types of Committees; Centralization Vs Decentralization of Authority and Responsibility; Staffing-Need and Importance, Recruitment and Selection Process.

**08 Hours****Module – III**

**Entrepreneurship:** Definition of Entrepreneur, Importance of Entrepreneurship, concepts of Entrepreneurship, Characteristics of successful Entrepreneur, Classification of Entrepreneurs, Myths of Entrepreneurship, Entrepreneurial Development models, Entrepreneurial development cycle, Problems faced by Entrepreneurs and capacity building for Entrepreneurship.

**08 Hours****Module – IV**

**Modern Small Business Enterprises:** Modern Small Business Enterprises: Role of Small-Scale Industries, Impact of Globalization and WTO on SSIs, Concepts and definitions of SSI Enterprises, Government policy and development of the Small-Scale sector in India, Growth and Performance of Small Scale Industries in India, Sickness in SSI sector, Problems for Small Scale Industries, Ancillary Industry and Tiny Industry.

**08 Hours**

## Module – V

**Projects Management:** A Project. Search for a Business idea: Introduction, Choosing an Idea, Selection of product, The Adoption process, Product Innovation, Product Planning and Development Strategy, Product Planning and Development Process. Concepts of Projects and Classification: Introduction, Meaning of Projects, Characteristics of a Project, Project Levels, Project Classification, Aspects of a Project, The project Cycle, Features and Phases of Project management, Project Management Processes. Project Identification: Feasibility Report, Project Feasibility Analysis. Project Formulation: Meaning, Steps in Project formulation, Sequential Stages of Project Formulation, Project Evaluation. Project Design and Network Analysis: Introduction, Importance of Network Analysis, Origin of PERT and CPM, Network, Network Techniques, Need for Network Techniques, Steps in PERT, CPM, Advantages, Limitations and Differences.

**08 Hours**

### Course Outcomes:

On completion of this course, the students are able to:

- CO1:** Describe the basics principles of management.
- CO2:** Distinguish clearly between the importance and role of organizing and staffing.
- CO3:** Discuss entrepreneur mindset to develop and plan for a new venture.
- CO4:** Interpret the concepts in establishing business idea.
- CO5:** Demonstrate functions and types of project management.

### Textbooks:

- 1) Principles of Management – P. C. Tripathi, P.N. Reddy – Tata McGraw Hill. ISBN: 15-978
- 2) Dynamics of Entrepreneurial Development & Management- Vasant Desai, Himalaya Publishing House. ISBN: 98345789
- 3) Entrepreneurship Development – Poornima. M. Charantimath, Small Business Enterprises Pearson Education - 2006 (2 & 4). ISBN – 15: 34519801

### Reference Books:

- 1) Management Fundamentals - Concepts, Application, Skill Development – Robers Lusier, Thomson. ISBN-10: 0324306083
- 2) Entrepreneurship Development - S.S.Khanka, S. Chand & Co. New Delhi. ISBN:9788121920148.
- 3) Management - Stephen Robbins, Pearson Education/PHI - 17<sup>th</sup> Edition, 2003. ISBN:4388876091.

### E-Resources:

- 1) <https://www.grin.com/document/453320>
- 2) <https://som.yale.edu/faculty-research-centers/centers-initiatives/program-on->
- 3) <https://businesscasestudies.co.uk/category/case-studies/people/>

## ONLINE CERTIFICATION

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST76	0 :0:0:4	01	CIE:50SEE:50	03 Hours	Online Course

### Activity of Online Certification Course

Students need to select one course on Information Technology from any of the following online platforms: NPTEL, Swayam, edx, Udemy, etc., and had to complete the course online. The student should submit the online certification course completion certificate and report.

### Course Outcomes:

- CO1:** Demonstrate a solid understanding of the core concepts and principles within the subject area of the certification course
- CO2:** Acquire hands-on skills and technical proficiency in relevant tools, technologies, or methodologies associated with the certification
- CO3:** Develop the ability to analyze problems within the context of the course and apply critical thinking to propose effective solutions
- CO4:** Communicate ideas, findings, and solutions clearly and effectively through written, oral, or multimedia formats
- CO5:** Develop a mindset of adaptability to changes in technology or industry standards

## PROJECT PHASE – I

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSP77	0:0:4:0	02	CIE:50 SEE:50	03 Hours	Project

### Activity of Phase – I

Batch formation, project identification, literature survey, finalization of problem statement with objectives and outcomes, Synopsis submission, Preliminary seminar for the approval of selected topic and objectives.

**Course Outcomes:**

- CO1:** Review the current state of Art and trends in their area of interest in current technologies and identify a suitable problem in their chosen subject domain with justification.
- CO2:** Survey the available research literature/documents for the tools and techniques to be used.
- CO3:** Examine the functional, non-functional, and performance requirements of their chosen problem definition.
- CO4:** Design system architecture for different components and develop all the system components using appropriate tools and techniques.
- CO5:** Work effectively in a team and use good project management practices and defend the project work as a team.

# **VIII Semester Course Syllabus**

**EIGHT SEMESTER B.E. – SYLLABUS****TECHNICAL SEMINAR**

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSP81	0 :0: 4 :0	01	CIE:50 SEE:50	03 Hours	Seminar

**Activity of Technical Seminar**

Students need to select one technical topic on latest trends in Information Technology and has to present seminar on the topic selected. The technical seminar report to be submitted.

**Course Outcomes:**

- CO1:** Get exposure to a variety of research projects and activities in order to enrich their academic experience.
- CO2:** Analyze information about current trends and emerging technologies.
- CO3:** Improve communication skills, presentation skills and other soft skills.
- CO4:** Develop skills in discussion of research topics in a public forum.
- CO5:** Gain knowledge about advanced research methodologies in the field, including theory inter disciplinary approaches, and the analysis of available primary sources.

**INTERNSHIP**

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSP82	0 :0: 0 : 6	03	CIE:50 SEE:50	03 Hours	Internship

**Activity of Internship**

Students need to complete Internship at Industry and should submit the certificate along with the report.

**Course Outcomes:**

- CO1:** Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s.
- CO2:** Solve real life challenges in the workplace by analyzing work environment and conditions, and selecting appropriate skill sets acquired from the course;
- CO3:** Recommend ideas to improve work effectiveness and efficiency by analyzing challenges and considering viable options.
- CO4:** Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means.
- CO5:** Exhibit critical thinking and problem-solving skills by analyzing underlying issue/s to challenges.

## PROJECT PHASE, EVALUATION AND VIVA VOCE (EXTERNAL)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSP83	0 :0: 18 :8	11	CIE:100SEE:100	03 Hours	Project

### Activity of Phase

Design, Theoretical /experimental investigation and Midterm seminar to review the progress of the work and documentation (Mid-term report). Completion of the project work, participation in the project exhibition, Submission of project report Final Internal seminar and demonstration, Publications.

### Course Outcomes:

- CO1:** Review the current state of Art and trends in their area of interest in current technologies and identify a suitable problem in their chosen subject domain with justification.
- CO2:** Survey the available research literature/documents for the tools and techniques to be used.
- CO3:** Examine the functional, non-functional, and performance requirements of their chosen problem definition.
- CO4:** Design system architecture for different components and develop all the system components using appropriate tools and techniques.
- CO5:** Work effectively in a team and use good project management practices and defend the project work as a team.