



NAGARJUNA

COLLEGE OF ENGINEERING & TECHNOLOGY

**Outcome Based Education(OBE)/
Choice Based Credit System (CBCS) Curricula**

2020-2021

Department of Computer Science and Engineering
NAGARJUNA COLLEGE OF ENGINEERING & TECHNOLOGY
Mudugurki Village, Venkatagiri Kote Post, Devanahalli taluk,
Bangalore district - 562 164


PRINCIPAL

Nagarjuna College of Engineering & Technology
Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164



NAGARJUNA
COLLEGE OF ENGINEERING & TECHNOLOGY

An Autonomous College under VTU

***DEPARTMENT OF COMPUTER SCIENCE &
ENGINEERING***

**III to VIII Semester
*Scheme and Syllabus***

VISION

Excellence in creating globally competent professionals and moulding them as leaders in Computer Science & Engineering education and research

MISSION

- M1:** Maintaining excellence in Computer Science & Engineering education through academic professionalism, teaching, curricula which reflect the changing needs of the society.
- M2:** Establishing center of excellence by creating knowledge through research and industrial exposure in the area of Computer Science & Engineering.
- M3:** Developing communication skill, leadership qualities, teamwork & skills for continuing education among the students.
- M4:** Inculcating ethics, human values and skills for solving societal problems and environmental protection.
- M5:** Validate engineering knowledge through innovative research projects to enhance their employability and entrepreneurship skills.

With Effect from Academic Year 2020-21

PRINCIPAL

**Nagarjuna College of Engineering & Technology
Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164**

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The graduates of Computer Science and Engineering are expected to fulfill the following PEOs after a few years of their graduation.

PEO1: Graduates in Computer Science and Engineering will apply the technical knowledge of analysis and design of software used for sustainable societal growth.

PEO2: Graduates of Computer Science and Engineering will demonstrate logical thinking and programming skills.

PEO3: Graduates in Computer Science and Engineering will demonstrate good communication skills, dynamic leadership qualities with concern for environmental protection.

PEO4: Computer Science and Engineering graduates will be capable of pursuing higher studies, take up research and development work blended with ethics and human values.

PEO5: Computer Science and Engineering graduates will have the ability to become entrepreneurs there by switching over from responsive engineer to creative engineer.

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.



PRINCIPAL

Nagarjuna College of Engineering & Technology
Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

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 Team work:

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: Life Long 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):

Program Specific Outcomes (PSOs) are what the graduates of a specific undergraduate engineering program should be able to do at the time of graduation.

PSO1: Professional Skills:

The ability to understand, analyze 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:

The 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 data structure and suitable algorithms.


PRINCIPAL
Nagarjuna College of Engineering & Technology
Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

**Outcome Based Education(OBE)/
Choice Based Credit System (CBCS) Curricula**

Third Semester B.E. – Scheme

SL. No	Course Code	Course Name	Total Credits	L:T:P:S (Hrs/Week)	Online	Offline	Marks	Weekly load
1	19CSM31	Integral Transforms & Applications	3	2 : 2 : 0 : 0	-	100%	100	0+4
2	19CSI32	Data Structures using C(IC)	4	2 : 0 : 4 : 0		100%	100	0+8
3	19CSI33	Web Programming (IC)	3	2 : 0 : 4 : 0		100%	100	0+6
4	19CSI34	Python Programming (IC)	4	2 : 0 : 4 : 0		100%	100	0+8
5	19CST35	Analog and Digital Electronics	3	2 : 2 : 0 : 0	20%	80%	100	1+2
6	19CST36	Computer Organization & Architecture	3	2 : 2 : 0 : 0	80%	20%	100	2+1
7	19CPH37	Constitution of India and Professional Ethics and Human Rights	1	0 : 2 : 0 : 0	100%	-	100	1+0
8	19KAK38	Kannada	1	0 : 2 : 0 : 0	100%		100	1+0
9		Placement Training-I	2	1 : 0 : 2 : 0	-	100%	100	0+2
		Total	24	13: 10 :14 :0			900	5+31


PRINCIPAL
 Nagarjuna College of Engineering & Technology
 Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

Outcome Based Education (OBE)/
Choice Based Credit System (CBCS) Curricula

Fourth Semester B.E. – Scheme

SL. No	Course Code	Course Name	Total Credits	L:T:P:S (Hrs/Week)	Online	Offline	Marks	Weekly load
1	19CSM41	Statistics and Probability	3	2 : 2 : 0 : 0	-	100%	100	0+4
2	19CSI42	Design and Analysis of Algorithms (IC)	4	2 : 0 : 4 : 0	-	100%	100	0+8
3	19CSI43	Object Oriented Programming with Java (IC)	4	2 : 0 : 4 : 0		100%	100	0+8
4	19CSI44	Database Concepts through MySQL (IC)	3	2 : 0 : 2 : 0		100%	100	0+6
5	19CST45	Operating Systems	3	2 : 2 : 0 : 0	70%	30%	100	2+1
6	19CST46	Introduction to Microprocessors & Microcontrollers	3	2 : 2 : 0 : 0	30%	70%	100	1+2
7	19UHV47	Universal Human Values-2	3	3 : 0 : 0 : 0	100%		100	2+0
8		Placement Training-II	2	1 : 0 : 2 : 0		100%	100	0+2
		Total	25	16 : 6 : 12 : 0			800	5+31
Note: Internship has to be completed compulsorily before VIII Semester								


PRINCIPAL
 Nagarjuna College of Engineering & Technology
 Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

NAGARJUNA COLLEGE OF ENGINEERING AND TECHNOLOGY
(An Autonomous College under VTU)

Department of Computer Science and Information Science and Engineering

Fifth Semester BE – Scheme

Sl. No.	Course Code	Course Name	Teaching Dept.	L-T-P-S (Hrs./Week)	Total Credits	Marks
1.	18CSI51	Database Concepts	CSE/ISE	3:0:2:0	4	100
2.	18CSI52	Advanced JAVA	CSE/ISE	3:0:2:0	4	100
3.	18CST53	Operating Systems	CSE/ISE	3:1:0:0	3	100
4.	18CST54	Software Engineering	CSE/ISE	3:1:0:0	3	100
5.	18CSI55X	Foundation Elective-IV	CSE/ISE	3:0:2:0	4	100
6.	18EET56X	Engineering Elective-V	CSE/ISE/ECE/CIVIL	3:1:0:0	3	100
7.	18CSL57	Operating Systems Laboratory	CSE/ISE	1:0:2:0	2	100
8.	18CSH58	Environmental Science	CSE/ISE	1:0:0:0	1	100
9.	18CSH59	Placement Training-III	Placement Department	1:0:2:0	2	100
		Total			26	900

Foundation Elective- IV (IC)

Sl. No.	Course Code	Course Name
1	18CSI551	Introduction to Microcontrollers & Microprocessors
2	18CSI552	Artificial Intelligence
3	18CSI553	PHP Programming

Engineering Elective -V

Sl. No.	Course Code	Course Name
1	18EET561	Information Retrieval
2	18EET562	Digital Switching Systems
3	18EET563	Green Buildings
4	18EET564	Project Based Learning/Mini Projects

Sixth Semester BE – Scheme

Sl. No.	Course Code	Course Name	Teaching Dept.	L:T:P-S (Hrs./Week)	Total Credits	Marks
1.	18CST61	Python Programming	CSE/ISE	3:1:0:0	3	100
2.	18CSI62	Computer Networks	CSE/ISE	3:0:2:0	4	100
3.	18CSI63	Android Application Development	CSE/ISE	3:0:2:0	4	100
4.	18CSI64X	Foundation Elective-VI	CSE/ISE	3:0:2:0	4	100
5.	18EET65X	Engineering Elective-VII	CSE/ISE/ECE/CIVIL	3:1:0:0	3	100
6.	18HOE66X	Open Elective –VIII	CSE/ISE/ECE/CIVIL	3:0:0:0	3	100
7.	18CSL67	Python Programming Laboratory	CSE/ISE	1:0:2:0	2	100
8.	18CSH68	Humanities	BASIC SCIENCE	3:0:0:0	1	100
9.	18CSH69	Placement Training- IV	Placement Department	2:0:2:0	3	100
		Total			27	900

Foundation Elective- VI (IC)

Sl. No.	Course Code	Course Name
1	18CSI641	Advanced Cloud Computing
2	18CSI642	Introduction to Block Chain
3	18CSI643	Information & Network Security

Engineering Elective -VII

Sl. No.	Course Code	Course Name
1	18EET651	Image Processing
2	18EET652	Nano-electronics
3	18EET653	Water Resources Engineering
4	18EET654	Project Based Learning/certification (NPTEL, IITs etc.)


PRINCIPAL
 Nagarjuna College of Engineering & Technology
 Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

Open Elective -VIII

Sl. No.	Course Code	Course Name
1	18HOE661	Technical Certification+ Seminar
2	18HOE662	Robotic Process Automation
3	18HOE663	Yoga and Meditation


PRINCIPAL
Nagarjuna College of Engineering & Technology
Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

**Choice Based Credit System (CBCS) Curricula
Seventh Semester B.E. - Scheme**

Sl. No.	Course Code	Course Name	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17CSI71	Internet of Things (IoT) (IC)	CS	3-0-2-0	4	100
2	17CST72	Android Application Development	CS	2-0-0-0	2	100
3	17CSI73X	Foundation Elective-IX (IC)	CS	3-0-2-0	4	100
4	17CST74X	Engineering Elective-X /PBL	CS	3-0-0-0	3	100
5	17HOE75X	Open Elective-XI	CS/BS&H/ME	2-0-0-4	3	100
6	17HOE76X	Open Elective-XII	CS/BS&H	2-0-0-4	3	100
7	17CSL77	Information and Network Security Laboratory	CS	1-0-2-0	2	100
8	17CSL78	Android Application Development Laboratory	CS	1-0-2-0	2	100
9	17CSP79	Project Phase-I and Seminar	CS	0-0-6-0	3	100
	Total			17-0-14-8	26	900

Foundation Elective - IX (IC)

Sl. No.	Course Code	Course Name
1	17CSI731	Object Oriented Modeling and Designing
2	17CSI732	Big Data
3	17CSI733	Web Technologies – Servlet, JSP

Engineering Elective - X / PBL

Sl. No.	Course Code	Course Name
1	17CST741	System Modeling and Simulation
2	17CST742	C# and .Net (MOOCS)
3	17CST743	Managing Big Data with MySQL (Certificate Course), Duke University


PRINCIPAL
 Nagarjuna College of Engineering & Technology
 Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

Open Elective - XI

Sl. No.	Course Code	Course Name
1	17HOE751	Tax Management
2	17HOE752	Assessment of Building Energy Performance (Offered by ASHRAE)
3	17HOE753	National Disaster Management and Mitigation
4	17HOE754	Certification Course (Online)

Open Elective - XII

Sl. No.	Course Code	Course Name
1	17HOE761	Small & Medium Enterprise Management
2	17HOE762	Occupational Safety and Health Administration
3	17HOE763	Animation and Multimedia Engineering
4	17HOE764	Certification Course (Online)


PRINCIPAL
Nagarjuna College of Engineering & Technology
Devanahalli (Tq) Bengaluru (Dt.)-Pin: 562164

FOURIER SERIES, TRANSFORMS AND NUMERICAL TECHNIQUES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSM31	2 : 2 : 0 : 0	3	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

Syllabus

Module – I

Fourier Series: Periodic functions, Dirichlet's conditions, Euler's Formulae (without proof), Fourier series of periodic functions of period $2l$ and 2π , 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 t^n 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- Regula Falsi 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:

- Demonstrate Fourier series to study the behavior of periodic functions and their applications in engineering problem.
- Find the Laplace transform of different types of functions.
- Use the Laplace transform and inverse Laplace Transform in solving various types engineering application problems.
- Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising

in Engineering applications.

- Determine the roots of Algebraic and Transcendental equations and Interpolation arising in engineering applications, using numerical methods

Text Books:

- Dr. B.S. Grewal: “Higher Engineering Mathematics”, (Chapters 10, 21, 22, 28, 29, 30), Khanna Publishers, New Delhi, 42nd Edition, 2012, ISBN:9788174 091955.
- 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, 9th Edition, 2011, ISBN 13: 9788126531356.
2. B.V. Ramana: “Higher Engineering Mathematics”, Tata Mc Graw –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>

DATA STRUCTURES USING C(IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI32	3:0:2:0	4	CIE:50 SEE:50	3 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

Syllabus

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 Redblack . **08 hours**

Laboratory:

12 hours

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. (All_Allowances = 123% of Basic, Income Tax (IT) = 30% of the gross salary (gross salary = Basic_Salary + All_Allowance), Net_Salary = Basic_Salary + All_Allowances – 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:

- Use pointers and heterogeneous data types
- Apply linear data structures for processing of ordered or unordered data.
- Explore various operations on dynamic data structures
- Implement the concept of non linear data structures such as trees.
- Solve the real world problems using Data Structures.

Text Books:

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed : “Fundamentals of Data Structures in C”, (Chapters 1-6,9,10), Universities Press-India, 2nd Edition, 2008, ISBN-13: 978-8173716058.
2. 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.
3. 2. 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://ww.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 : 4 : 0	3	CIE:50 SEE:50	3 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 also, to comprehend HTML, CSS scripts to design web layouts.
- Acquire Java Script skills for developing client side web applications.
- Interpret the use of jQuery libraries to simplify complicated JavaScript applications and also, to perform DOM manipulation using jQuery 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.

Syllabus

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, iframes, 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.

08 Hours

Module – V

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

08 Hours

Laboratory:

I. HTML and CSS

1. Write a HTML script to display employee details like name, address, mobile number, email id 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 coverpage which displays the events taking place in and around the state.

II. JavaScript

5. Write a HTML and javascript program to implement a simple banking application. The application should provide features like withdraw, deposit, balance enquiry etc.
6. Write a HTML and javascript 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 envelop, 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:

- Design attractive web layouts using HTML5 and style sheets in a presentable form.
- Develop interactive UI for client side web applications using Java Script.
- Integrate jQuery libraries to accelerate UI development for client side web applications.
- Construct responsive web pages by integrating bootstrap framework.
- Develop applications by using XML to use, store, transmit and display data over web.

Text Books:

1. Robert W. Sebesta: "Programming the World Wide Web", Pearson, 4th Edition, 2012, ISBN: 978-81-317-6458-9.
2. Jon Duckett: "Web Design with HTML, CSS, JavaScript and jQuery Set", Wiley, 1st Edition, 2014, ISBN 13: 978-1118907443.
3. Silvio Moreto, Matt Lambert, Benjamin Jakobus, Jason Marah:" Bootstrap 4 - Responsive Web Design", Packt Publishing, 2016, ISBN 978-1-78839-731-5

Reference Books:

1. Jake Spurlock: "Bootstrap, Shroff", O'Reilly Media, United States of America, 1st Edition, 2013, ISBN: 978 -1 -4493-4391-0.
2. Bear Bibeault, Yehuda Katz and Aurelio De Rosa: "jQuery in Action", Dreamtech Press, New Delhi, India, 3rd Edition, 2015, ISBN: 978-1617292071

E-Resources:

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

PYTHON PROGRAMMING (IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI34	2-0-4-0	4	CIE:50 SEE:50	3 Hours	FC

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.

Syllabus

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 – IV

Classes and objects, Classes and functions, Classes and methods, Types of methods, Inner class, Inheritance, Constructor, Method Overloading, Method Overriding. **08hours**

Module – V

Exception Handling, MultiThreading, File handling. **08 hours**

Laboratory

- 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

- Use Python syntax and semantics in developing simple programs.
- Demonstrate proficiency in handling Strings and Lists.
- Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Develop exemplary applications using files in Python

Text Books:

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

Reference Books:

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd, 2013. *ISBN-13: 978-8126556014*.
2. Mark Lutz, "Programming Python", 4th Edition, O'Reilly Media, 2011. *ISBN-13: 978-9350232873*.
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. *ISBN-13: 978-9332555365*.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1st 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	3	CIE:50 SEE:50	3 Hours	FC

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.

Syllabus

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: Multivibrators using IC-555, Peak Detector, Schmitt trigger, Active Filters, Non-Linear Amplifier, Relaxation Oscillator. **09 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 **07 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, Demultiplexers, 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 representation of FLIP-FLOPs, HDL implementation of FLIP-FLOP

Registers: Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In-Serial Out, 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

- Use of diodes in clippers, limiters and clampers.
- Design transistor and MOSFET amplifiers in different configurations
- Apply K-Map and Quine-McClusky methods to simplify the given Boolean expressions.
- Implement the registers using Flip-Flops.
- Demonstrate the various counters

Text Books:

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 Malvino 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. Robert L. Boylestad, Louis Nashelsky: “Electronic Devices and Circuit Theory”, PHI/Pearson Education, New Delhi, 10th Edition, 2012, ISBN: 9788131764596.
2. David A. 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.
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

COMPUTER ORGANIZATION & ARCHITECTURE

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CST36	2:2:0:0	3	CIE:50 SEE:50	3 Hours	FC

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.

Syllabus

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.

08Hours

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, 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, Micro programmed Control.

Pipelining: Basic concepts of pipelining,

08Hours

Course Outcomes:

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

- Explain the basic organization of a computer system.
- Demonstrate the functioning of different sub systems such as processor, Input/output.
- Evaluate performance of memory systems.

- Design and analyze simple arithmetic and logical units.
- Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.

Text Books:

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”, 5th 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	1	CIE:50 SEE:50	2 Hours	-

COURSE OBJECTIVE:

This course will enable students to:

- Learn about the preamble of 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.

Syllabus:

Module-1

introduction to constitution: Introduction, making of constitution, Salient features of the constitution, preamble of the Indian constitution. Fundamental rights & limitations. **03 Hours**

Module-2

DPSP, Union Executives: Directive principles of state policy, Fundamental duties, union executives- President, Prime minister, Parliament, supreme court of India. **03Hours**

Module-3

State executives, Electoral process, Amendments: State executives- Governor, CM, state legislature, High courts, Electoral process. Amendment Procedures, Amendments -42nd, 44th, 74th, 76th, 86th and 91st. **02 Hours**

Module-4

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-5

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:

- Familiarize with fundamental rights and duties.
- Recognize the electoral process.
- Get exposed to legislature and judiciary.
- Realize special provisions given for women, children and weaker section of the society.
- Exhibit engineering ethics and responsibilities of engineers.

Text Book:

1. D. Srinivasan, "Constitution of India, professional ethics", Himalaya Publishing House, 2006, 1st Edition.

Module – I

Introduction Algorithms:

2. Dr. Umapati K L, Ramesh L. Chakrasali, “Constitution of India, professional ethics”, elite publishers, 2006, 2nd Edition.

Reference Books:

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

APPLIED CALCULUS AND PROBABILITY DISTRIBUTIONS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	CourseNType
19MAT41	2:2:0:0	3	CIE:50 SEE:50	3 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.

Syllabus

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:

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

Text Books:

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 Lipschutz 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>.

Dynamic Programming :

ESIGN AND ANALYSIS OF ALGORITHMS (IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI42	3:0:2:0	4	CIE:50 SEE:50	3 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.

Syllabus

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

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

08 hours

Module – IV

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

08hours

Module – V

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

Laboratory:

12 hours

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:

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

Text Books:

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, Ronal 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	2:0:4:0	4	CIE:50 SEE:50	3 Hours	FC

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.

Syllabus

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.

08Hours

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.

08Hours

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

Laboratory

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

```
*****
```

```
*****
```

```
****
```

```
***
```

```
**
```

```
*
```

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/-

PF=10% of basic PT=Rs100/-

4. Write a Java program that displays area of different Figures(Rectangle,Square,Triangle) using the method overloading.
5. Write a Java program that displays the time in different formats in the form of HH,MM,SS using constructor Overloading.
6. Write a Java program that counts the number of objects created by using static variable.
7. Write a java program that implements educational hierarchy using inheritance.
8. Write a java program that implements Array Index out of bound Exception using built-in-Exception.
9. Write a java program that implements bank transactions using user defined exception.
10. 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:

- Explain the difference between Procedure and Object Oriented Programming.
- Develop basic JAVA programs.
- Apply Inheritance properties and packages in solving real world problems.
- Use exception handling methods efficiently.
- Demonstrate the programs by using multithreaded concepts.

Text Books:

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

Reference Books:

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

E-Resources:

1. www.geeksforgeeks.org/java/
2. www.tutorialspoint.com/java/index.htm

DATABASE CONCEPTS THROUGH MYSQL (IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CSI44	2:0:2:0	3	CIE:50 SEE:50	3 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.
- Get 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.
- Get a clear understanding of how to design and develop applications using JDBC and SQL.

Syllabus

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 Modelling 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**

Laboratory

1. 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:

- Describe the basic concepts of database and Database Management System, enforce integrity constraints on a database using RDBMS.
- Implement Structured Query Language (SQL) queries for database manipulation.
- Create complex sql queries and use them for database manipulation.
- Apply indexing structures for file handling.
- Design database systems for current trend applications to interact with databases using JDBC

and database to save and retrieve data in a safe and consistent manner.

Text Books:

1. Fundamentals of Database Systems; RamezElmasri and Shamkant B. Navathe;Pearson; 5thEdition; 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:The Complete 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, ISBN 0-07-352332-1

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%20-%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	3	CIE:50 SEE:50	3 Hours	FC

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.

Syllabus

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.

08Hours

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. **08Hours**

Module – III

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

08Hours

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.

08Hours

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.

08Hours

Course Outcomes:

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

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

Text Books:

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 Dhamdhare, "Operating Systems: A Concept Based Approach " , 3rd Ed, McGraw-Hill, 2013. ISBN: 9781259005589.

E-Resources:

1. 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	3:0:0:0	3	CIE:100 SEE:100	3 hours	Theory

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

Syllabus

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 Pseudo code. **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:

- Describe the Intel 8085/8086 architecture with explanation of internal organization of some popular microprocessors/microcontrollers.
- Construction of a maintainable assembly language program for an algorithm.
- Conclude the Intel 8085/8086 real mode memory addressing.
- Describe the functioning of peripheral Ics.
- Designing of microprocessor and microcontroller based system.

Text Books :

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 microcontroller, 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	2-1-0-3				

Universal Human Values 2: Understanding Harmony

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.

Universal Human Values 2: Understanding Harmony

Pre-requisites: None. Universal Human Values 1 (desirable)

1. **Objective:** The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), 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.

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

Module 1

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 fulfilment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

Method to fulfil 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

Module 2

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 I 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

Module 3:

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 fulfilment 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

Module 4:

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 selfregulation 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.

Module 5:

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 peoplefriendly 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) Sessions eg. to discuss the conduct as an engineer or scientist etc.

3. Readings: 3.1

Text Book 1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P 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 - PanditSunderlal
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)

4. **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 analysing 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.

6. Outcome of the Course:

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. This is only an introductory foundational input. It would be desirable to follow it up by a) faculty-student or mentor-mentee programs throughout their time with the institution b) Higher level courses on human values in every aspect of living. E.g. as a professional.

DATABASE CONCEPTS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI51	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

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.
- Get 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 manipulate using indexing.
- Get a clear understanding of how to design and develop applications using JDBC and SQL.

Syllabus

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 Modelling 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

Laboratory

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

Course Outcomes

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

- Understand the basic concepts of database and Database Management System, enforce integrity constraints on a database using RDBMS.
- Use Structured Query Language (SQL) for database manipulation.
- Use Structured Query Language (SQL) to implement complex queries.

- Understand the structure of data using Index.
- Design database 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; Ramez Elmasri and Shamkant B.Navathe; Pearson; 5th Edition; ISBN978-81-317-1625-0.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGrawHill
3. Hector Garcia-Molina, Jeff Ullman and Jennifer Widom, “Database Systems: The Complete Book”, Pearson Education, Second Edition, 2008.

Reference Books:

1. Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, McGrawHill, 2013.

ADVANCED JAVA (IC)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI52	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

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.

Syllabus

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 valueOf(), Changing the Case of Characters Within a String, Additional String Methods, String Buffer, String Builder, Primitive Type Wrappers. **08Hours**

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, Datatypes, Exceptions. **08 Hours**

List of Lab Experiments:

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,

- Implement String handling techniques in JAVA programming effectively.
- Access Collection class and Collection interface for JAVA programming.
- Interpret Collection algorithms and use Legacy classes and interfaces.
- Interpret concepts of Input/output Streams in Files.
- Implement the concepts of connectivity of Database through JDBC.

Textbooks:

1. Herbert Schildt, “JAVA the Complete Reference”, 9th Edition, Tata McGraw Hill, 2011, ISBN-13: 9781259002465.
2. Jim Keogh, “J2EE - The Complete Reference”, 1st Edition, McGraw Hill, 2017, ISBN-13: 9780070529120.

Reference Book:

1. Y. Daniel Liang, “Introduction to JAVA Programming”, 10th Edition, Pearson Education, 2013, ISBN-13: 978-0133761313.

E-Resources:

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

OPERATING SYSTEMS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CST53	3:1:0:0	3	CIE:50 SEE:50	3 Hours	FC

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.

Syllabus

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.

08Hours

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. **08Hours**

Module – III

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

08Hours

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.

08Hours

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.

08Hours

Course Outcomes:

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

- Demonstrate functional architecture of an operating system.
- Describe process scheduling, multithreading and synchronization Concepts.
- Use suitable techniques for handling the deadlocks.
- Apply various memory management techniques.
- 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. Andrews. Tanenbaum, HerbertBos, "ModernOperatingSystems", 4th edition, Pearson, India, 2014. ISBN-13: 978-0133591620.
2. D.M Dhamdhare, “Operating Systems: A Concept Based Approach “, 3rd Ed, McGraw-Hill, 2013. ISBN:9781259005589.

E-Resources:

1. https://www.tutorialspoint.com/operating_system/index.htm.
2. <https://www.studytonight.com/operating-system/>.

SOFTWARE ENGINEERING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CST54	3:1:0:0	3	CIE:50 SEE:50	3 hours	FC

Course Objectives:

- Outline software engineering principles and activities involved in building large software programs.
- Identify ethical and professional issues and explain why they are of concern to software engineers.
- Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation.
- Discuss the distinctions between validation testing and defect testing.

Syllabus

Module - I

INTRODUCTION

Introduction: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. FAQ's about software engineering, Professional and ethical responsibility.
Software Processes: Models: Waterfall Model, Incremental Model and Spiral Model. Process activities.

08 Hours

Module – II

REQUIREMENTS

Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; the software requirements document. **Requirements Engineering Processes:** Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.

08 Hours

Module – III

SOFTWARE DESIGN

Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles. Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution.

08 hours

Module – IV

SOFTWARE IMPLEMENTATION

Rapid Software Development: Agile methods; Extreme programming; Rapid application development. Software Evolution: Program evolution dynamics; Software maintenance.

08 hours

Module – V

TESTING

TESTING: Verification and Validation: Planning; Software inspections; automated static analysis; Verification and formal methods. Software testing: System testing; Component testing; Test case design; Test automation.

08 hours

Course Outcomes

After study of the course, the students are able to:

- Design a software system, component, or process to meet desired needs within realistic constraints.
- Assess professional and ethical responsibility
- Function on multi-disciplinary teams
- Use the techniques, skills, and modern engineering tools necessary for engineering practice
- Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

Textbooks:

1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5, 7, 8, 9, 23, and24).

References

1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.
2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India.

Introduction to Microcontrollers & Microprocessors

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI551	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to:

- Understand the architecture of 8086 microprocessor, 8051 microcontrollers.
- Learn software development tools to assemble, test and debug the programs.
- Interpret the concepts of assembler directives in programming.
- Gain the knowledge about basic concepts of microcontrollers and its peripherals
- Develop Microprocessor/ Microcontroller based systems for a given application.

Syllabus

Module – I

Introduction to 8086 Microprocessor: Microprocessor Evolution and types, 8086 Internal Architecture: The BIU and the Execution Unit, Segmentation, Pin Diagram of 8086, Introduction to Programming the 8086.

10 Hours

Module – II

8086 Assembly Language Programming-1: Addressing Modes of 8086, Assembler Directives, Instruction Set of 8086. Data Transfer Instructions, Arithmetic Instructions, Bit Manipulation Instructions, Branching Instructions, Processor Control Instructions and String Instructions.

10 Hours

Module – III

8086 Assembly Language Programming-2: Macros, Procedures, Assembly Language Programming Examples. Introduction to 8051 Microcontrollers: Comparison of Microprocessors and Microcontrollers, Architecture and Pin Functions of 8051 Microcontroller, Program Counter and Data Pointer, Flags and the Program Status Word, Internal Memory Organization, Special Function Register, Stack Operation.

10 Hours

Module – IV

Programming in 8051: Addressing modes and instruction set of 8051, simple programs. 8051 Microcontroller Based System Design-1: Input/output Port Programming, Programming timers, Asynchronous Serial Data Communication, Interrupt Service Routines.

10 Hours

Module – V

8051 Microcontroller Based System Design-2: Programming in C, Interfacing Matrix Keyboard and Seven Segment Displays, Interfacing ADC and DAC, Interfacing of LCD Display.

10 Hours

Course Outcomes:

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

- Explain the architecture, instruction sets and design principles of processor/controller-based systems.
- Identify the different attributes to be satisfied while designing processor/controller-based applications.
- Analyze the given problem statement and to write program for that particular application.
- Evaluate the communication and bus interfacing concepts.
- Design I/O and Memory interfacing circuits.

Textbooks:

1. Douglas V. Hall, “Microprocessors and Interfacing: Programming and Hardware”, Revised 2nd Edition, TMH, 2006, ISBN: 978-0-07-060167-3
2. Muhammad Ali Mazidi, Jancice Gillispie Mazidi and Rolin D McKinlay” The 8051 Microcontroller and Embedded Systems: using Assembly and C”, Pearson Education, 2nd Edition, 2009, ISBN: 978-81-317-1026-5
3. Kenneth J. Ayala; “The 8051 Microcontroller Architecture, Programming and Applications”, 2nd Edition, Thomson Learning; ISBN: 978-1401861582

Reference Books:

1. Barry B. Brey, “The Intel Micro-processors, Architecture, Programming and Interfacing”, 6thEdition, Pearson Education, 2008, ISBN: 978-81-317-2622-8.
2. Yu-cheng Liu and Glenn Gibson” microcomputers systems the 8086/8088 family, architecture, programming & design”, 4thEdition, PHI, 2008, ISBN: 978-81-203-0409.
3. Raj Kamal, “Microcontrollers Architecture, Programming, Interfacing and System Design”, 2nd Edition, Pearson Education, 2011, ISBN:978-81-317-5990-5.

E-Resources:

1. <https://www.sciencedirect.com/topics/computer-science/von-neumann-architecture>
2. https://nptel.ac.in/content/storage2/courses/106108100/pdf/Teacher_Slides/mod1/M1L3.pdf
3. https://swayam.gov.in/nd1_noc20_ee11/preview
4. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108105102/lec23.pdf

ARTIFICIAL INTELLIGENCE

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI552	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

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 representation to specify domains and reasoning tasks of a situated software agent.
- Understand different logical systems for inference over formal domain

Syllabus

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. **09 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; back tracking search for CSPs. Adversial search: Games; Optimal decisions 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. **07 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**

LIST OF PROGRAMS

1. Study of PROLOG. Write the following programs using PROLOG
2. Write a program to solve 8 queens' problem.
3. Solve any problem using depth first search.
4. Solve any problem using best first search.

5. Solve 8-puzzle problem using best first search.
6. Solve Robot (traversal) problem using means End Analysis.
7. Solve traveling salesman problem.

Course Outcomes:

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

- Design intelligent agents for solving simple gaming problems.
- Apply non-trivial AI techniques to handle complex problems.
- Apply various symbolic knowledge representation to specific problems.
- Design Knowledge-based agents.
- Describe syntax and semantics of first-order logic.
- Explain inference in first order logic.

Textbook:

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%20A%20Modern%20Approach.pdf>.
2. <http://www.getfreebooks.com/16-sites-with-free-artificial-intelligence-ebooks/>

PHP PROGRAMMING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI553	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to:

- Gain basic Knowledge of PHP.
- Understand basic concepts of arrays and control structures.
- Learn the concepts of String functions in PHP.
- Acquire the knowledge of how to retrieve and manipulate data from files.
- Learn Database Connectivity to web applications.

Syllabus

Module – I

INTRODUCTION TO PHP: Introduction to Open Source Technology–Introduction to PHP–How PHP works–the PHP.infile–Basic PHP Syntax–PHP Tags–PHP Statements and Whitespace–Comments – PHP for Web Application–Variables –Variables Types –Variable Names(Identifiers)–Type Strength – Variable Scope – Super global– Constants Variable– **08Hours**

Module – II

ARRAYS AND CONTROL STRUCTURE: Arrays – Types of Array, Multidimensional array, Variable, Contents, Operator In PHP. If–Else Statement, Nested-If Statement, Switch Statement Looping Structure – For Loop, While Loop, Do While Loop, For each Loop. **08 hours**

Module – III

FUNCTIONS IN PHP: Definition and Syntax of Function, User Defined Function, System Defined Function, Parameterized and Non-Parameterize Function. Date & Time Function, Hash Function, Mail Function, File Inclusion–Include(), Require(),StringFunction–Chr(),strlen(),strops(),strcmp().Testing and Manipulation Functions. **08Hours**

Module – IV

FILE HANDLING: Login Security Authentication (Users Logins) – Authorization (permissions) – Encryption – Session Cookies PHP Mail, File Handling, and File Uploading. **08hours**

Module – V

Working with Database and SQL: Introducing Database and SQL- Using MySQL-Adding and modifying Data-Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML— Simple XML and DOM Extension. **08Hours**

Laboratory

1. Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
2. Write a PHP program to display a digital clock which displays the current time of the server.

3. Write the PHP programs to do the following:

- a. Implement simple calculator operations.
- b. Find the transpose of a matrix.
- c. Multiplication of two matrices.
- d. Addition of two matrices.

4. Write a PHP program named states.py that declares a variable states with value "Mississippi Alabama Texas Massachusetts Kansas". write a PHP program that does the following:

- a. Search for a word in variable states that ends in xas. Store this word in element 0 of a list named states List.
- b. Search for a word in states that begins with k and ends in s. Perform a case in sensitive comparison. [Note: Passing re.Ias a second parameter to method compile performs a case-insensitive comparison.] Store this word in element1 of states List.
- c. Search for a word in states that begins with M and ends in s. Store this word in element 2 of the list.
- d. Search for a word in states that ends in a. Store this word in element 3 of the list

5. Write a PHP program to sort the student records which are stored in the database using selection sort.

6. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.

7. Create a script to construct the following pattern, using nested for loop.

```
*
* *
* * *
* * * *
* * * * *
```

Course Outcomes

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

- Understand the basics of PHP programming.
- Demonstrate the concepts of arrays and control structures.
- Interpret the concepts of String functions in PHP.
- Understand how to retrieve and manipulate data from files.
- Demonstrate Database Connectivity to web applications.

Textbooks:

1. VikramVaswani “PHP: A Beginner ‘s Guide”, 1st Edition, Tata McGraw-Hill Education, 2008. ISBN: 9780071549028.

Reference Books:

1. Stever Holzner, "PHP: The complete Reference", 1st Edition, McGraw-Hill Education, 2008.
ISBN: 9780070223622, 0070223629
2. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS&HTML5", 5th Edition, O'REILLY, 2014.
ISBN: 9781491978917

INFORMATION RETRIEVAL

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18EET61	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Learn the information retrieval models.
- Be familiar with Web Search Engine.
- Be exposed to Link Analysis.
- Understand Hadoop and MapReduce.
- Learn document text mining techniques.

Syllabus

Module – I

INTRODUCTION: Introduction -History of IR- Components of IR – Issues –Open source Search engine Frameworks–The impact of the web on IR–The role of artificial intelligence (AI)in IR–IR Versus Web Search – Components of a Search engine- Characterizing the web. **08Hours**

Module – II

INFORMATION RETRIEVAL: Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR - Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion. **08Hours**

Module – III

WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING: Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement - search engine optimization/spam–WebSearchArchitectures-crawling-meta-crawlers-FocusedCrawling-web indexes — Near-duplicate detection - Index Compression -XML retrieval. **08Hours**

Module – IV

WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH: Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity - Hadoop & Map Reduce - Evaluation - Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling “invisible” Web - Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval. **08Hours**

Module – V

DOCUMENT TEXT MINING: Information filtering; organization and relevance feedback –Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees.

07Hours

Course Outcomes:

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

1. Apply information retrieval models.
2. Design Web Search Engine.
3. Use Link Analysis.
4. Use Hadoop and MapReduce.
5. Apply document text mining techniques.

Textbooks:

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and BerthierRibeiro – Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books2011.
3. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
4. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley,2010.

Reference Books:

1. Stefan Buettcher, CharlesL.A. Clarke, GordonV. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press,2010.
2. Ophir Frieder “Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series “, 2nd Edition, Springer, 2004.
3. Manu Konchady, “Building Search Applications: Lucene, Ling Pipe”, and First Edition, Gate Mustru Publishing,2008.

E-Resources:

1. <http://berlin.csie.ntnu.edu.tw/Courses>
2. https://www.tutorialspoint.com/natural_language_processing/natural_language_processing_information_retrieval.htm

Digital Switching Systems					
Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET562	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable the students to,

- Understand the network and hierarchical structure for telecommunication transmission.
- Explain the importance of switching over wired and wireless channels.
- Analyze the traffic management and grade of service of the switching systems.
- Evaluating the traffic in different systems and modeling software for the switching systems.
- Design the software and hardware for the maintenance of switching systems.

Syllabus

Module – I

Development of Telecommunications: Network structure, Network services, terminology, Regulation, Standards. Introduction to telecommunications transmission, Power levels, Four wire circuits, Digital transmission, FDM, TDM, PDH and SDH. **08Hours**

Module – II

Evolution of switching systems: Introduction, Message switching, Circuit switching, Functions of switching systems, Distribution systems, Basics of crossbar systems, Electronic switching. Digital switching systems: Switching system hierarchy, Evolution of digital switching systems, Stored program control switching systems, Building block so digital switching system, Basic call processing. **08 hours**

Module – III

Telecommunications Standards: Introduction to communication traffic, Unit of traffic, Congestion, Traffic measurement, Mathematical model, lost call systems, Queuing systems. Switching systems: Introduction, Single stage networks, Gradings, Link Systems, GOS of Linked systems. **08Hours**

Module – IV

Time Division Switching: Introduction, space and time switching, Time switching networks, Synchronization. Switching system software: Introduction, Basic software architecture, Digital switching system software classification, Call models, Software linkages during call, Feature flow diagram. **08Hours**

Module – V

Maintenance of digital switching system: Introduction, Software maintenance, Interface of a Typical digital switching system central office, System outage and its impact on digital switching system reliability, Impact of software patches on digital switching system maintainability, A methodology for proper maintenance of digital switching system. A generic digital switching system model: Introduction, Hardware architecture, Software architecture, Recovery strategy, Simple call through a digital switching system, common characteristics of digital switching system. **08Hours**

Course Outcomes:

On completion of this course the students should be able to

- Explain the telecommunication traffic and its measurements.
- Interpret the technologies associated with the data switching operations.
- Analyze the multiplexing technologies for efficient bandwidth operations.
- Applying multiplexing concept in digital switching systems.
- Design and Create required architecture for digital switching systems

Textbooks:

1. Digital Telephony - John C Bellamy: Wiley India Pvt. Ltd, 3rd Ed, 2008.
ISBN:978-0471345718
2. Telecommunication and Switching, Traffic and Networks-JEFlood: PearsonEducation,2002.
ISBN:978-8131705025.

Reference Books:

1. Digital Switching Systems, Syed R. Ali, TMH Ed 2002. ISBN: 9780070483903.

Green Buildings					
Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET563	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Syllabus

Module – I

Introduction: Environmental implications of buildings energy, carbon emissions, High performance green buildings; Building materials: sources, methods of production and environmental implications. Embodied Energy in Building Materials: Transportation Energy for Building Materials; Maintenance Energy for Buildings. **08Hours**

Module – II

Implications of Building Technologies Embodied Energy of Buildings: Framed Construction, Masonry Construction. Resources for Building Materials, Alternative concepts. Recycling of Industrial and Buildings Wastes. Biomass Resources for buildings. Methods and tools for building assessment: LEED, Green globe, living building challenge. **08Hours**

Module – III

Building energy and strategies: Low energy buildings, renewable energy systems. Economic issues and analysis, Life cycle assessment.
Comforts in Building: Thermal Comfort in Buildings- Issues; Heat Transfer Characteristic of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings-Implications of Geographical Locations. **08Hours**

Module – IV

Solar buildings: Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. **08Hours**

Module – V

Green Composites for buildings: Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment. **08Hours**

Course Outcomes:

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

- Know the applications of building materials and energy involved.
- Apply the different technologies and methods involved in green buildings.
- Study different Strategies involved in green building.
- Summarize importance of solar energy in green buildings.
- Assess the causes and effects of waste and to know the effects on green buildings.

Textbooks:

1. K.S. Jagadish, B. U. Venkatarama reddy, K. S. Nanjundarao: “Alternative Building Materials and Technologies”,(Chapters1-4,6),2ndEdition, New Age International, 2007, ISBN: 978-93-859-2387-6 ,
2. Peavy, Tchobanoglous: “Environmental Engineering”, Volume-2, (Chapters 6,10- 12), ISBN: 0-07-049134-8.

Reference books:

1. Osman Attmann: “Green Architecture Advanced Technologies and Materials”, (Chapters 2,4,6-9) McGraw Hill, 2010, ISBN:9780071625012.
2. Jerry Yudelson: “Green building Through Integrated Design”, (Chapters 5-7) McGraw Hill, 2009, ISBN:9780071546010.
3. Walker, B, W. Steffen: “Global change and terrestrial ecosystems”, International geosphere-biosphere program, Cambridge University Press,1996, ISBN-13:9780521578103.

OPERATING SYSTEMS LABORATORY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSL57	1:0:2:0	2	CIE:50 SEE:50	3 Hours	EFC

List of Programs PART A

1. Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin d) Priority.
2. Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.
3. Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c) Linked
4. Write a C program to simulate the MVT and MFT memory management techniques.
5. Write a C program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First fit
6. Write a C program to simulate paging technique of memory management.
7. Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.
8. Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU d) Optimal
9. Write a C program to simulate producer-consumer problem using semaphores.
10. Write a C program to simulate the concept of Dining-Philosophers problem

Environmental Science

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSH58	1:0:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course will enable the students to

- To identify the major challenges in environmental issues and evaluate possible solutions.
- Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.
- To analyze an overall impact of specific issues and develop environmental management plan.
- To Understand various factors for Pollution
- To Understand the concepts of GIS and Remote Sensing.

Syllabus

Module – I

Introduction: Environment – Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, And Economic & Social Security. Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation Environmental Impact Assessment, Sustainable Development **03Hours**

Module – II

Natural Resources, Water resources – Availability & Quality aspects, Waterborne diseases & water induced diseases, Fluoride problem in drinking water Mineral resources, Forest Wealth Material Cycles – Carbon Cycle, Nitrogen Cycle & Sulphur Cycle. Energy – Different types of energy, Conventional sources & Non-Conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy. **3Hours**

Module – III

Environmental Pollution – Water Pollution, Noise pollution, Land Pollution, Public Health Aspects. Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Wastewater Management. **02Hours**

Module – IV

Air Pollution & Automobile Pollution: Definition, Effects – Global Warming, Acid rain & Ozone layer depletion, controlling measures. Solid Waste Management, E-Waste Management & Biomedical Waste Management – Sources, Characteristics & Disposal methods. **03Hours**

Module – V

Introduction to GIS & Remote sensing, Applications of GIS & Remote Sensing in Environmental Engineering Practices. Environmental Acts & Regulations, Role of government, Legal aspects, Role of Non-governmental Organizations (NGOs) , Environmental Education & Women Education. **02Hours**

Course Outcomes:

On completion of this course the students are able to

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

- To get a knowledge of Pollution and Remote Sensing Concepts.

Textbooks:

1. Benny Joseph (2005), “Environmental Studies”, Tata McGraw – Hill Publishing Company Limited.
2. R.J. Ranjit Daniels and Jagadish Krishnaswamy, (2009), “Environmental Studies”, Wiley India Private Ltd., NewDelhi.
3. R Rajagopalan, “Environmental Studies – From Crisis to Cure”, Oxford University Press,2005,
4. Aloka Debi, “Environmental Science and Engineering”, Universities Press (India) Pvt. Ltd.2012.

Reference Books:

1. Raman Sivakumar, “Principals of Environmental Science and Engineering”, Second Edition, Cengage learning Singapore,2005
2. P. Meenakshi, “Elements of Environmental Science and Engineering”, Prentice Hall of India Private Limited, New Delhi,2006
3. S.M. Prakash, “Environmental Studies”, Elite Publishers Mangalore,2007
4. Erach Bharucha, “Textbook of Environmental Studies”, for UGC, University press,2005
5. G. Tyler Miller Jr., “Environmental Science – working with the Earth”, Tenth Edition, Thomson Brooks /Cole,2004

E-Resources:

1. https://en.wikipedia.org/wiki/Environmental_social_science
2. <https://www.environmentalscience.org/>

PYTHON PROGRAMMING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CST61	3-1-0-0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to

- Learn Basic syntax of python programming.
- Learn the concepts of Strings and File handling in python.
- Gain knowledge of core data structures.
- Acquire knowledge of Object-Oriented Concepts in python.
- Realize the use of Multi-Threading and Databases.

Syllabus

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, Files. **08 hours**

Module – III

Lists, Dictionaries, Tuples, Regular Expressions. **08hours**

Module – IV

Classes and objects, Classes and functions, Classes and methods, Types of methods, Inner class, Inheritance, Constructor, Method Overloading, Method Overriding. **08hours**

Module – V

Exception Handling, Multi-Threading, Using databases and SQL. **08hours**

Course Outcomes

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

- Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate proficiency in handling Strings and Filesystems.
- Implement Python Programs using core data structures like Lists, Dictionaries and use regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement exemplary applications related to Databases in Python.

Textbooks:

1. Charles R. Severance, “Python for Everybody: Exploring Data Using Python 3”, 1 st Edition, CreateSpace Independent Publishing Platform,2016.
(http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf) (Chapters 1 – 13, 15).
2. AllenB.Downey,"ThinkPython:HowtoThinkLikeaComputerScientist",2ndEdition,GreenTeaPress,2015.(<http://greenteapress.com/thinkpython2/thinkpython2.pdf>)(Chapters 15,16,17)(Download pdf files from the above links)

Reference Books:

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1 st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014
2. MarkLutz, “ProgrammingPython”,4thEdition, O’ReillyMedia, 2011.ISBN-13:978-9350232873
3. WesleyJChun, “CorePythonApplicationsProgramming”,3rdEdition, Pearson Education India, 2015. ISBN-13: 978-9332555365
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, “Data Structures and Algorithms in Python”,1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176
5. Reema Thareja, “Python Programming using problem solving approach”, Oxford university press, 2017

E-Resources:

1. <https://www.youtube.com/watch?v=hEgO047GxaQ>

COMPUTER NETWORKS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI62	3:0:2:0	4	CIE:50 SEE:50	3 hours	IC

Course Objectives:

This course will enable students to:

- Understand the basics of data flow, 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.
- Establish deeper understanding of TCP, UDP protocols and also, network security concepts.
- Learn the use of various application layer protocols.

Syllabus

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**

Course Outcomes

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

- Establish appropriate switched networks based on the network models and use them for communication.
- Resolve errors that occur during communication and, to analyze DLC protocols.
- Assign/map internet (logical) addresses to PDUs as well as, they can implement different routing algorithms

- Implement network applications choosing either TCP or UDP depending on the requirements and also, can integrate security measures for the applications
- Use application level protocols in the current technology trends.

Textbooks:

1. Behrouz A. Forouzan, Data Communication and Networking, 5th Edition, TataMcGraw-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: DataandComputerCommunication, 8th Edition, PearsonEducation, 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>

ANDROID APPLICATION DEVELOPMENT

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI63	3:0:2:0	4	CIE:50 SEE:50	3 hours	FC

Course Objectives:

This course will enable students to:

- Describe the Android SDK features and the Development Framework and understanding Activities
- Learn adaptive, responsive user interfaces that work across a wide range of devices.
- Understand background work and long-running tasks in Android applications
- Know the concepts of Storing, sharing and retrieving data in Android applications
- Learn how permissions, security and performance affect application. Finally, make sure your app is ready to share with the world, and publish it.

Syllabus

Module – I

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. **08Hours**

Module – II

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

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 (SDCard), Choosing the Best Storage Option, Using Static Resources, Creating and Using Databases. **08 Hours**

Module – IV

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

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.**08Hours**

List of Lab programs

12Hours

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

1. Install Android Studio and Run HelloWorld
2. Create and Start Activity Lifecycle and Instance State
3. Create Implicit Intents
4. Make Your First Interactive UI Using Layouts and Text View Elements
5. Using an Options Menu
6. Create a RecyclerView
7. Drawable, Themes and Styles
8. Create an Async Task
9. Connect to the Internet
10. Broadcast Receiver
11. Set and retrieve shared preferences
12. Implement a simple content provider

Part-B

Develop a suitable application to implement the skills learnt in the theory and the exercises indicated in Part-A.

Course Outcomes

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

- Analyze the basic features of Android Platform and Create Activities in Android.
- Demonstrate the design concepts of user interface using components, views and menus in Android.
- Create and use databases for Android Application.
- Implement messaging services in Android.
- Deploy mobile applications in various marketplaces for distribution.

Textbooks:

1. Wei – Meng Lee, Beginning Android Application Development, Wiley publications. (Chapters 1,2,3,4,5,6,7,8,10,11)
2. Reto Meier, Professional Android 4 Application Development, Wiley publications.

Reference Books:

1. Mark Murphy; BeginningAndroid3; A pressSpringerIndiaPvtLtd.;1stEdition; 2011; ISBN13: 978-1-4302-3297-1
2. Sayed Hashimi, Satya Komatineni, Dave MacLean; Pro Android 4; A press Springer IndiaPvt Ltd; 1st Edition; 2012; ISBN:978-1-4302-3930-7

- 3 . RetoMeier; Professional Android 2 Application Development; WileyIndiaPvt.ltd;1stEdition; 2012; ISBN:9788126525898
4. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To, Addison-Wesley Professional;2010.
5. Wei – Meng Lee, Beginning Android Application Development, Wiley publications (Lab Programs)
6. RetoMeier, Professional Android 4 Application Development, Wiley publications (Lab Programs).

E-Resources:

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

ADVANCED CLOUD COMPUTING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI641	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to:

- Understand the Cloud infrastructure components and service management processes
- Explain the fundamentals of cloud computing
- Illustrate the cloud application programming and aneka platform
- Differentiate Various cloud platforms used in industry

Syllabus

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, Amazon Web Services(AWS), Google App Engine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjrasoft Aneka, Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples Xen: Paravirtualization, VMware: Full Virtualization, Microsoft Hyper-V. **08hours**

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, Techniques for Parallel Computation with Threads, Multithreading with Aneka, Introducing the Thread Programming Model, Aneka Thread vs. Common Threads, Programming Applications with Aneka Threads, Aneka Threads Application Model, Domain Decomposition: Matrix Multiplication, Functional Decomposition: Sine, Cosine, and Tangent. 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, MPI Applications, Workflow Applications with Task Dependencies, Aneka Task-Based Programming, Task Programming Model, Developing Applications with the Task Model, Developing Parameter Sweep Application, Managing Workflows. **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, Aneka MapReduce Programming, Introducing the MapReduce Programming Model Example Application. **08Hours**

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 Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Applications Scientific Applications, Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Biology: Gene Expression Data Analysis for Cancer Diagnosis, Geoscience: Satellite Image Processing, Business and Consumer Applications, CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming. **08 hours**

Laboratory

List of Experiments

1. Installation and Configuration of Just cloud.
2. Working in Cloud9 to demonstrate different language.
3. Installation and Configuration of Hadoop/Eucalyptus
4. Working and installation of Microsoft AZURE
5. Working with Mangrasoft 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:

- Explain cloud computing, classify services of cloud computing
- Illustrate architecture and programming in cloud
- Describe the platforms for development of cloud applications and List the application of cloud.
- Analyze different Cloud platform in industry and their applications

Textbooks:

Rajkumar Buyya, Christian Vecchiola, and ThamaraiSelvi Mastering Cloud. Computing McGraw Hill Education ISBN: 9780124095397

Reference Books:

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

INTRODUCTION TO BLOCK CHAIN

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI642	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

The Students will be able to learn: -

- Be Able to explain what is block chain
- Be able to explain why we need block chain? What is the real-world problems that block chain is trying to solve?
- Understand and describe how block chain works
- Explain the underlying technology of transactions, blocks, proof-of-work, and consensus building
- How does block chain exist in the public domain (decentralized, distributed) yet maintain transparency, privacy, anonymity, security, immutability, history

Syllabus

MODULE-I

Introduction to Block chain: Backstory of Block chain, what is Block chain? Centralized vs. Decentralized Systems, Layers of Block chain, why is Blockchain Important? Limitations of Centralized Systems, Blockchain Adoption So Far, Blockchain Uses and Use Cases **How Blockchain Works-1:** Laying the Blockchain Foundation, Cryptography, Symmetric Key Cryptography, Cryptographic Hash Functions.

Self Study: MAC and HMAC

08Hours

MODULE-II

How Blockchain Works-2: Asymmetric Key Cryptography, Diffie-Hellman Key Exchange, Symmetric vs. Asymmetric Key Cryptography, Nash Equilibrium, Prisoner's Dilemma, Byzantine Generals' Problem, Zero-Sum Games, Why to Study Game Theory, Computer Science Engineering, The Blockchain, Merkle Trees, Putting It All Together, Properties of Blockchain Solutions, Blockchain Transactions, Distributed Consensus Mechanisms, Blockchain Applications, Scaling Blockchain, Off-Chain Computation, Sharding Blockchain State

Self-Study: Game Theory

08Hours

MODULE-III

How Bitcoin Works: The History of Money, Dawn of Bitcoin, What Is Bitcoin? Working with Bitcoins, The Bitcoin Blockchain, 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, Full Nodes vs. SPVs, Full Nodes, SPVs, Bitcoin Wallets.

Self-Study: Putting it All Together

08Hours

MODULE-IV

How Ethereum Works: From Bitcoin to Ethereum, Ethereum as a Next-Gen Blockchain, Design Philosophy of Ethereum, Enter the Ethereum Blockchain, Ethereum Blockchain, Ethereum Accounts, Trie Usage, Merkle Patricia Tree, RLP Encoding, Ethereum Transaction and Message Structure, Ethereum State Transaction

Function, Gas and Transaction Cost, Ethereum Smart Contracts, Contract Creation, Ethereum Virtual Machine and Code Execution, Ethereum Ecosystem, Swarm, Whisper, DApp, Development Components

Self-Study: Ethereum Ecosystem

08Hours

MODUE-V

Blockchain Application Development :Decentralized Applications, Blockchain Application Development, Libraries and Tools, Interacting with the Bitcoin Blockchain, Setup and Initialize the bitcoins Library in a node.js Application, Create Keypairs for the Sender and Receiver, Get Test Bitcoins in the Sender's Wallet, Get the Sender's Unspent Outputs, Prepare Bitcoin Transaction, Sign Transaction Inputs, Create Transaction Hex, Broadcast Transaction to the Network, Interacting Programmatically with Ethereum—Sending Transactions, Set Up Library and Connection, Set Up Ethereum Accounts, Get Test Ether in Sender's Account, Prepare Ethereum Transaction, Sign Transaction, Send Transaction to the Ethereum Network, Interacting Programmatically with Ethereum—Creating a Smart Contract, Prerequisites, Program the Smart Contract, Compile Contract and Get Details, Deploy Contract to Ethereum Network, Interacting Programmatically with Ethereum—Executing Smart, Contract Functions, Get Reference to the Smart Contract, Execute Smart Contract Function, Blockchain Concepts Revisited, Public vs. Private Blockchains, Decentralized Application Architecture.

Self-Study: Public Nodes vs. Self-Hosted Nodes, Decentralized Applications and Servers

08Hours

Textbook:

- Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions by Bikramaditya Singhal, Gautam Dhameja and Priyansu SekharPanda

Reference Books:

- Blockchain Technology: Cryptocurrency and Applications by S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press2019.
- Bitcoin and cryptocurrency technologies: a comprehensive introduction by Arvind Narayanan et. Al, Princeton University Press2016
- <https://www.coursera.org/specializations/introduction-to-blockchain4>.<https://nptel.ac.in/courses/106/104/1061042>
[20/](#)

Course Outcome's

- Understand the structure of a blockchain and why/when it is better than a simple distributed database
- Explain the significance of cryptographic algorithms in block chain
- Describe the features and importance of Bitcoin
- Explain about the principles of Ethereum Virtual Machine
- Design, build, and deploy smart contracts and distributed applications

INFORMATION AND NETWORK SECURITY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSI643	3:0:2:0	4	CIE:50 SEE:50	3 hours	FE

Course Objectives:

This course will enable students to

- Understand various block cipher and stream cipher models.
- Understand the concepts of Firewall, Remote connections, Honeypots.
- Describe the principals of hash functions and random numbers.
- Become familiar with the basics of public key management and certification.
- Understand the concepts of cryptographic applications.

Syllabus

Module –I

Introduction. How to Speak Crypto. Classic Crypto. Simple Substitution Cipher. Crypt analysis of a Simple Substitution. Definition of Secure. Double Transposition Cipher. One-time Pad. Project VENONA. Codebook Cipher. Ciphers of the Election of 1876. Modern Crypto History. Taxonomy of Cryptography. Taxonomy of Cryptanalysis. **08 Hours**

Module – II

Security Technology - 1: Introduction; Physical design; Firewalls; Protecting Remote Connections. Security Technology – 2: Intrusion Detection Systems (IDS); Honey Pots, Honey Nets. **08 Hours**

Module –III

What is a Hash Function? The Birthday Problem. Non-cryptographic Hashes. Tiger Hash. HMAC. Uses of Hash Functions. Online Bids. Spam Reduction. Other Crypto-Related Topics. Secret Sharing. Key Escrow. Random Numbers. Texas Hold 'em Poker. Generating Random Bits. Information Hiding. **08 Hours**

Module –IV

Key management fundamentals, key lengths and lifetimes key generation, key establishment, key storage, key usage, governing key management, public key management, certification of public keys, the certificate lifecycle, public key management models alternative approaches. **08 Hours**

Module – V

Cryptographic applications, cryptography on the internet, cryptography for wireless local area networks, cryptography for mobile telecommunications, cryptography for secure payment card transactions, cryptography for video broadcasting, cryptography for identity cards, cryptography for home users. **08 Hours**

Laboratory

1. Perform an experiment to grab a banner with telnet and perform the task using Netcat.
2. Using nmap
3. 1) Find Open ports on a system
2) Find machines which reactive

- 3) Find the version of remote OS on other systems
- 4) Find the version of s/w installed on other system (using nmap or any other software)
4. Perform an experiment to demonstrate how to sniff for router traffic by using the tool Cain and Abel / Wireshark / tcpdump
5. Perform an experiment to demonstrate the use of DumpSec.
6. Perform a wireless audit of an access point / router and decrypt WEP and WPA. (Using Net Stumbler or air sniff)
7. Perform an experiment to sniff traffic using AR poisoning
8. Demonstrate Intrusion Detection System (IDS) using any tool such as Snort or any other Software.
9. Install Root Kit and study variety of options
10. Generate minimum 10 passwords of length 12 characters using OpenSSL command.
11. Setup a honey pot and monitor the honey pot on network
12. Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and Management.
13. Install IPCop on a Linux system and learn all the functions available on the software

Course Outcomes

Student will be able to:

- Describe the history and taxonomy of cryptography.
- Demonstrate the working of intrusion detection systems and honeypots.
- Explain the application of hash functions.
- Illustrate the need of key management.
- Describe the applications of cryptography.

Textbooks:

1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Cengage Learning, 2005. (Chapters 5, 6, 7, 8; Exclude the topics not mentioned in the syllabus)
2. Information Security: Principles and Practice, 2nd Edition by Mark Stamp Wiley
3. Everyday Cryptography: Fundamental Principles and Applications Keith M. Martin Oxford Scholarship Online: December 2013.

Reference Books:

1. Behrouz A. Forouzan: Cryptography and Network Security, Special Indian Edition, Tata McGraw- Hill, 2007.
2. Applied Cryptography Protocols, Algorithms, and Source Code in C by Bruce Schneier
3. William Stallings: Network Security Essentials: Applications and Standards, 3rd edition, Pearson Education, 2007.

E-Resources:

1. <https://www.nmap.org>
2. <https://www.advanced-port-scanner.com>
3. <https://www.openssl.org>

IMAGE PROCESSING

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18EET651	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Study the fundamental concepts of image representation and image processing system.
- Understand the different techniques involved in the enhancement and filtering of images.
- Have a basic knowledge on image restoration.
- Know how to segment the image.
- Learn about morphological operations on given image.

Syllabus

Module – I

Introduction to Image Processing: Digital Image Fundamentals Light, brightness adaption and discrimination, Human visual system, Image as a 2D data, Image representation Gray scale and Color images, Image sampling and quantization, Color Fundamentals, Color Models, Pseudo-color image processing. **08Hours**

Module – II

Image Enhancement and Filtering: Image enhancement and filtering in spatial domain: Intensity transformation functions: Contrast stretching, Thresholding, Image negative, Log transformation, Power-law transformation, Intensity level slicing and Bit-plane slicing. Image histogram, Histogram equalization process. Fundamentals of spatial filtering, Correlation and convolution, Spatial filtering mask for low pass filtering (smoothing) and high pass filtering (sharpening). **08Hours**

Module – III

Image Restoration: Reasons for image degradation, Model of image degradation/ restoration process, Noise probability density functions, Image restoration using spatial filtering (Mean filters, Order statistic filters and adaptive filters), Inverse Filtering, MMSE(Wiener)Filtering. **08Hours**

Module – IV

Image Segmentation: Edge based segmentation, Region based segmentation, Region split and merge techniques, Region growing by pixel aggregation, optimal thresholding. **08Hours**

Module – V

Morphological Image Processing: Basic morphological operations, Erosion, dilation, opening, closing, Structuring elements, Hit-or-Miss transform, Basic Morphological Algorithms: hole filling, connected components, thinning, skeletons, Reconstruction by erosion and dilation. **08Hours**

Course Outcomes:

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

- Analyze and Develop any image processing application.
- Enhance and filter the image quality using image enhancement and filtering techniques.
- Develop the right image restoration technique to remove degradation from given image
- Interpret image segmentation technique.
- Perform morphological operations on given image.

Text Book:

1. Rafael C. Gonzalez and Richard E. Woods: “Digital Image Processing, 3rd Edition, Pearson Education, Pearson Education, 2014, ISBN-10: 9332518467, ISBN-13: 9789332518469, (Chapters 2,3,5.1-5.10,9,10).

Reference Books:

1. S Jayaraman, S Esakkirajan, T Veerakumar: “Digital Image Processing”, Tata Mc- Graw Hill Publication
2. S Sridhar: “Digital Image Processing”, Oxford University Press, ISBN-10: 0199459355, ISBN-13:9780199459353.

E-Resources:

1. <https://www.abebooks.com/9789332518469/Digital-Image-Processing-3rd-Edi-tion-9>
2. www.synergy.ac.in/intranet/classnotes/introduction.pdf

Nano Electronics

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET652	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Understand the basics of top-down and bottom-up fabrication process, devices and Systems
- Enhance basic engineering science and technical knowledge of nano electronics.
- Describe technologies involved in modern day electronic devices.
- Know various nanostructures of carbon and the nature of the carbon bond itself.
- Learn the photo physical properties of sensor used in generating a signal.

Syllabus

Module – I

Introduction to nanotechnology: Impacts, Limitations of conventional microelectronics, Trends in microelectronics and optoelectronics, mosfet basics and operation characteristic length sin mesoscopic systems, Classification of Nanostructures, Low dimensional structures Quantum wells, wires and dots, Density of states and dimensionality Basic properties of two dimensional semiconductor nanostructures, square quantum wells of finite depth, parabolic and triangular quantum wells Quantum wires and quantum dots, carbon nanotube, graphene

08 Hours

Module – II

Fabrication of nano-layers: Different approaches, physical vapor deposition, chemical vapour deposition Molecular Beam Epitaxy, Ion Implantation, Formation of Silicon Dioxide- dry and wet oxidation methods Fabrication of nano particle- grinding with iron balls, laser ablation , reduction methods, sol gel, self-assembly, precipitation of quantum dots

08 Hours

Module – III

Characterization of nanostructures: Tools used for of nano materials characterization, microscope-optical, electron, and electron microscope. Principle of operation of Scanning Tunneling Microscope, Atomic Force Microscope, Scanning Electron microscope, Specimen interaction. Transmission Electron Microscope X-Ray Diffraction analysis, PL & UV Spectroscopy, Particle size analyzer.

08Hours

Module – IV

Carbon Nanostructures: Carbon molecules, Carbon Clusters, Carbon Nanotubes, application of Carbon Nanotubes.

08Hours

Module – V

Nano electronic devices: MODFETS, hetero junction bipolar transistors Resonant tunnel effect, RTD, RTT, HotelectrontransistorsCoulombblockadeeffectandsingleelectrontransistor,CNTtransistorsHeterostructure semiconductor laser Quantum well laser, quantum dot LED, quantum dot laser Quantum well optical modulator, quantum well sub band photo detectors, principle of NEMS.

08 Hours

Course Outcomes:

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

- Illustrate the principles behind Nano science engineering and Nanoelectronics.
- Explain the effect of particles size on mechanical, thermal, optical and electrical properties of nano materials.
- Describe the properties of carbon and carbon nanotubes and its applications.
- Apply the knowledge to prepare and characterize nano materials.
- Analyze the process flow required to fabricate state-of-the-art transistor technology.

Textbooks:

1. J.M. Martinez-Duart, R.J. Martin Palma, F. Agulle Rueda Nanotechnology for Microelectronics and optoelectronics, Elsevier, 2006, ISBN9780080445533.
- 2 W.R. Fahrner, Nanotechnology and Nanoelectronics, Springer, 2005, ISBN9783540266211.

Reference Books:

3. Chattopadhyay, Banerjee, Introduction to Nano science & Technology, PHI, 2012, ISBN-13: 978- 8120336087.
4. George W. Hanson, Fundamentals of Nano electronics, Pearson Education, 2009, ISBN-13:9780.1B.
5. K. Goser, P. Glosekotter, J. Dienstuhl, Nano electronics and nano systems, Springer 2004, ISBN 978- 3-662-05421-5.
- 6.

E-Resources:

1. <https://www.sciencedirect.com/topics/materials-science/nanoelectronics>
2. <https://www.circuitstoday.com/nanoelectronics>

Water Resources Engineering

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET653	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Prepare the students for a successful career as hydrologist and water resources engineers.
- Develop the ability among students to synthesis data and technical concepts for application in hydrology and water resources engineering.
- Provide students with a sound found a tio nin the mathematical, scientific and engineering fundamentals necessary to formulate, analyze, solve engineering problems and to prepare them for their career.
- Provide students with advanced tools of data collection and the analysis of the same with respect to water resources.
- Promote student awareness for the lifelong learning and to introduce them professional ethics and codes of professional practice in water resources management.

Syllabus

Module - I

Basics of Hydrometeorology: Hydrologic cycle Global water budget Practical applications– Hydrometeorology Air front cyclones Formation of precipitation Types and forms of precipitation Climate and Weather Meteorological Observations.

Precipitation: Measurement of rainfall Rain gauges Radar Measurement of rainfall Rainfall Hyetograph Intensity Duration and Frequency analysis Consistency Missing data Rain gauge network Average depth of rainfall analysis (Theory and Problems).

08 Hours

Module – II

Surface Runoff: Concept of catchment, Linear, Areal and Relief Aspects, Detailed study of Runoff process, Factors affecting Runoff, Runoff estimation, Strange and SCS methods, yield estimation.

08Hours

Module – III

Ground Water: Groundwater in Hydrologic Cycle Origin of groundwater, Rock properties affecting groundwater, Types of aquifer, Darcy's law, coefficient of permeability, groundwater flow rates, permeability formulae, laboratory and field measurement of permeability, Groundwater movement.

08Hours

Module – IV

Water Harvesting and Conservation: Water Harvesting Techniques Micro Catchments Design of Small Water Harvesting Structures – Farm Ponds Percolation Tanks Yield from a Catchment, Site selection for artificial recharge Rain water and Runoff Harvesting in Rural and Urban Areas Reservoir Sedimentation.

08Hours

Module – V

Watershed Management: Project Proposal Formulation Watershed Development Plan Entry Point Activities Estimation Watershed Economics Agroforestry Grassland Management Wasteland Management Watershed Approach in Government Programmes Developing Collaborative know how People's Participation Evaluation of Watershed Management.

08Hours

Course Outcomes:

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

- Explain hydrologic cycle and hydro meteorological measurements with a know how about various methods of field measurements and estimation of precipitation.
- Recognizetheprocessofabstractionandrutoffwhichtheyapplytocarryout the assessment of water balance and runoff potential.
- Gain knowledge about basic aquifer parameters and groundwater resources for different hydro-geological boundary conditions.
- Recognize the need of water harvesting and conservation.
- Develop the water shed management concepts in accordance with importance to society.

Textbooks:

1. Subramanya K: "Hydrology", Tata McGraw-Hill, NewDelhi, ISBN: 9781259029974.
2. Jeya Rami Reddy P: "Hydrology", Laxmi Publications, New Delhi, ISBN: 9788170080992.
3. Vir Singh: "Watershed Planning and Management", Raj Yash Publishing House, Bikaner, ISBN:9788186882405.

Reference Books:

1. VenTchow: "Handbook of applied hydrology", McGraw Hill Book company. ISBN: 9780070107748.
2. S.K. Garg: "IrrigationEngineeringandHydraulicstructures",KhannaPublication, New Delhi, ISBN:978-8174090478.
3. P.N. Modi: "Irrigation, water Resources and water power Engineering", Standard book house, New Delhi, ISBN:978-8189401290.

ROBOTIC PROCESS AUTOMATION

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18HOE662	3:0:0:0	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to:

- Understand the Process and importance of automation
- Identify the anatomy of moving parts in a robot.
- Interpret robot actuation and feedback process.
- Determine the different sensors used in Robot.
- Develop Robotic intelligence, system integration and networking.

Syllabus

Module – I

Automation: History of Automation, Reasons for automation, Disadvantages of automation, Automation systems, Types of automation – Fixed, Programmable and Flexible automation, Automation strategies Automated Manufacturing Systems: Components, classification and overview of manufacturing Systems, Flexible Manufacturing Systems (FMS), Types of FMS, Applications and benefits of FMS **08Hours**

Module – II

Robotics: Definition of Robot, History of robotics, Robotics market and the future prospects, Robot Anatomy, Robot configurations: Polar, Cartesian, cylindrical and Jointed-arm configuration. Robot motions, Joints, Work volume, Robot drive systems, Precision of movement – Spatial resolution, Accuracy, Repeatability, End effectors – Tools and grippers. **08Hours**

Module – III

Controllers and Actuators: Basic Control System concepts and Models, Transfer functions, Block diagrams, characteristic equation, Types of Controllers: on-off, Proportional, Integral, Differential, P-I, P-D, P-I-D controllers. Control system and analysis. Robot actuation and feedback components Position sensors – Potentiometers, resolvers, encoders, velocity sensors. Actuators - Pneumatic and Hydraulic Actuators, Electric Motors, Stepper motors, Servomotors, Power Transmission systems. **08Hours**

Module – IV

Robot Sensors and Machine vision system Sensors in Robotics - Tactile sensors, Proximity and Range sensors, use of sensors in robotics. Machine Vision System: Introduction to Machine vision, the sensing and digitizing function in Machine vision, Image processing and analysis, Training and Vision systems. **08 Hours**

Module – V

The Robots Technology of the future: Robot Intelligence, Advanced Sensor capabilities, Telepresence and related technologies, Mechanical design features, Mobility, locomotion and navigation, the universal hand, system integration and networking. Artificial Intelligence: Goals of AI research, AI techniques – Knowledge representation, Problem representation and problem solving, LISP programming, AI and Robotics, LISP in the factory. **08 Hours**

Course Outcomes:

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

- Identify various types of automation & manufacturing systems.
- Explain different robot configurations, motions, drive systems.
- Analyze the basic concepts of different systems used in robots.
- Evaluate the working of transducers, sensors and machine vision systems.
- Create the future capabilities Artificial Intelligence in the field of robotics.

Textbooks:

1. Automation, Production Systems and Computer Integrated Manufacturing M.P. Groover, Pearson Education. 5th edition, 2009 ISBN-13: 978-9332572492.
2. Industrial Robotics, Technology, Programming and Applications by M.P. Groover, Weiss, Nagel, McGraw Hill International, 2nd edition, 2012. ISBN-13: 978-1259006210.

Reference Books:

1. Robotics, control vision and intelligence-Fu, Lee and Gonzalez. McGraw Hill International, 2nd edition, 2007. ISBN-13:978-0070226258

2. Robotic Engineering - An Integrated approach, Klafter, Chmielewski and Negin, PHI, 1st edition,2009.
ISBN-13:978-8120308428

E-Resources:

1. <https://www.robots.com/applications/material-handling>
2. <https://www.britannica.com/technology/automation/Robots-in-manufacturing>
3. <https://www.sciencedirect.com/science/article/pii/S1474667017665947>

Yoga and Meditation

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18HOE663	3:0:0:0	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to:

- Introduce the main principles of Yoga.
- Generate knowledge and skills of students to use the tools and techniques for using Yoga in day to day life for better health and wellbeing.
- Improve communication and increase concentration through Yoga and Meditation.
- Equip the individual to handle stressful situations and manage day to day activities.

Syllabus

Module – I

Definition and meaning of yoga: Meaning of Asanas, Types of Asana: standing, sitting and supine asanas. Standing Asanas (Trikonasan, padhastasan, ardha chakrasan, veerbhadrasan), Sitting Asanas (Vajrasan, padmasan, suptavajrasan, Ardha maschendras an, vakrasan), Supine Asanas (Sarvangasan, Matsyasan, Natarajasan, Shavasan) **08Hours**

Module – II

Patanjali's Yoga Sutra: Eight limbs of yoga, Importance of discipline in Yoga, Stillness of mind, Five Modulations (vritti) of the mind, Practice and Dispassion, Obstacles in the path of Yoga, Overcoming distractions of the mind through Yoga. **08Hours**

Module – III

Understanding physiological implications of Yoga, three types of Gunas (Satva, Rajas and Tamas) and their effects on body and mind, Food Habits, Meaning of Prana, Pranayama and its advantages, Different types of Pranayama. **08Hours**

Module – IV

Ayurveda: The science of life, three types of doshas (Vata, Pitta and Kapha), Balancing the different doshas for a healthy life, Ayurvedic principles of food and activity, Advanced Asanas: Mayurasana, Sirsasana, Gomukh Asana, Vrksahasana, BaddhaKonasana. **08Hours**

Module – V

Meditation: Meaning of meditation, Meditation vs Concentration, Advantages of Meditation, Effects of Meditation on body and mind, Effect on health and general wellbeing, reducing stress through meditation, increasing concentration, Improving communication, Effect on Environment **08Hours**

Course Outcomes:

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

- Know the basic principles of Yoga.
- Know and practice the basic asanas and their benefits.
- Use Pranayama and Meditation for improving health and mental peace.
- Know the difference between meditation and concentration.
- Apply the principles of Ayurveda and implement them for one's benefit.

Textbooks:

1. Yoga Sutras of Patanjali (ancient text).
2. B K S Iyengar: "Light on Yoga".

Reference Books:

1. A traditional touch to Yogasanas for beginners and Sadhakas, Swami Vivekananda Yoga Prakashana(SVYP).
2. Dr. Vasant Lad: "Ayurveda: The Science of Self-Healing: A Practical Guide".

PYTHON PROGRAMMING LABORATORY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSL67	1-0-2-0	2	CIE:50 SEE:50	3 hours	FC

Course Objectives:

This course will enable students to

- Learn Basic syntax of pythonprogramming.
- Learn the concepts of Strings and Expressions in python.
- Gain knowledge of core datastructures.
- Acquire knowledge of Object-oriented Concepts in python.
- Learn the concepts of searching and sorting techniques.

PART-A

- 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

PART-B

Mini Project

Batch of minimum 2 and maximum four students can select a real-world problem and develop a python based solution.

Course Outcomes

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

- Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
- Demonstrate usage of strings and expressions.
- Implement Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Implement various searching and sortingtechniques.

Textbooks:

1. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, CreateSpace Independent Publishing Platform, 2016.
(http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf) (Chapters 1 – 13, 15).

2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (<http://greenteapress.com/thinkpython2/thinkpython2.pdf>) (Chapters 15, 16, 17) (Download pdf files from the above links)

Reference Books:

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014
2. Mark Lutz, "Programming Python", 4th Edition, O'Reilly Media, 2011. ISBN-13: 978-9350232873
3. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
4. Roberto Tamassia, Michael H. Goldwasser, Michael T. Goodrich, "Data Structures and Algorithms in Python", 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176
5. Reema Thareja, "Python Programming using problem solving approach", Oxford University Press, 2017

HUMANITIES

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
18CSH68	3:0:0:0	3	CIE:50 SEE:50	3 hours	FC

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 “HUMANITIES” is designed which may be covered in their VI 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.

1. **Objective:** The objective of the course is four-fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), 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.

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

Module 1

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 fulfilment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
Method to fulfil 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

Module 2

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 I 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

Module 3:

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 fulfilment 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

Module 4:

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.

Module 5:

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) Sessions e.g. to discuss the conduct as an engineer or scientist etc.

3. Readings: 3.1

Textbook 1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P 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 - PanditSunderlal
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)

4. **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.

6. Outcome of the Course:

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. This is only an introductory foundational input. It would be desirable to follow it up by a) faculty-student or mentor-mentee programs throughout their time with the institution b) Higher level courses on human values in every aspect of living. E.g. as a professional.

Internet of Things (IoT) (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI71	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

Course objectives:

This course will enable students to :

- Study Vision and Introduction to IoT.
- Understand IoT Market perspective.
- Understand Data and Knowledge Management and use of Devices in IoT Technology.
- Understand State of the Art – IoT Architecture.
- Learn Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Syllabus

Module – I

IoT and Web Technology: The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics. **08 Hours**

Module – II

M2M to IoT - A Basic Perspective: Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. **06 Hours**

Module – III

M2M to IoT- An Architectural Overview: Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. **06 Hours**

Module – IV

IoT Architecture - State of the Art: Introduction, State of the art.

Architecture Reference Model: Introduction, Reference Model and architecture, IoT reference Model.

IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **10 Hours**

Module – V

IoT Applications for Value Creations: Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth. **10 Hours**

Laboratory

1. Sketch the architecture of IoT Toolkit and explain each entity in brief.
2. Demonstrate a smart object API gateway service reference implementation in IoT toolkit.
3. Write and explain working of an HTTP- to-CoAP semantic mapping proxy in IoT toolkit.
4. Explain application framework and embedded software agents for IoT toolkit.
5. Explain working of Raspberry Pi.
6. Connect Raspberry Pi with your existing system components.
7. Give overview of Zetta.

Design based Problems (DP) / Open Ended Problem:

1. How do you connect and display your Raspberry Pi on a Monitor Or TV?
2. Create any circuitry project using Arduino.

Major Equipment:

1. Raspberry pi, Arduino

Course Outcomes:

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

- Explain the vision of IoT from a global context.
- Determine the Market perspective of IoT.

CSE Scheme and Syllabus 2019 -2020

- Examine Devices, Gateways and Data Management.
- Describe the building state of the IoT architecture.
- Apply IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Text Book:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle: "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, (Chapters 1-4,8-10), Academic Press, 2014, ISBN: 9780080994017.

Reference Books:

1. Vijay Madiseti, Arshdeep Bahga: "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
2. Francis daCosta: "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

E-Resources:

1. <https://github.com/connectIOT/iottoolkit>
2. <https://www.arduino.cc/>
3. <http://www.zettajs.org/>
4. Contiki (Open source IoT operating system)
5. Arduino (Open source IoT project)



Android Application Development

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST72	2:0:0:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Learn Android SDK features and the Development Framework and understanding activities.
- Study adaptive, responsive user interfaces that work across a wide range of devices.
- Understand background work and long-running tasks in Android applications.
- Know the concepts of Storing, sharing and retrieving data in Android applications.
- Learn how permissions, security and performance affect application. Finally, make sure your app is ready to share with the world, and publish it.

Syllabus

Module – I

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. **05 Hours**

Module – II

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 . **05 Hours**

Module – III

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. **05 Hours**

Module – IV

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.

06 Hours

Module – V

Creating Your Own Services - Performing Long-Running Tasks in a Service, Performing Repeated Tasks in a Service, Executing Asynchronous Tasks on Separate Threads Using IntentService, 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.

05 Hours

Course Outcomes:

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

- Comprehend the basic features of Android Platform and Create Activities in Android.
- Demonstrate the design concepts of user interface using components, views and menus in Android.
- Create and use databases for Android Application.
- Implement messaging services in Android.
- Deploy mobile applications in various marketplaces for distribution.

Text Books:

1. Wei – Meng Lee: “Beginning Android Application Development”, Wiley Publications, (Chapters 1-8,10,11),
2. Reto Meier: “Professional Android for Application Development”, Wiley Publications.

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>



Object Oriented Modeling and Design (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI731	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Understand the concepts of object oriented approach to perform systems analysis and design.
- Learn the importance and limitations of object-oriented analysis and design.
- Show how object oriented analysis and design is applied in development of software.
- Point out the importance of UML model throughout the process of object oriented modeling and design.
- Gain the necessary knowledge and skills in using object-oriented CASE tools

Syllabus

Module-I

Introduction, Modeling Concepts, class Modeling: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history

Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models. **08 Hours**

Module-II

Advanced Class Modeling, State Modeling: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages.

State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; examples. **08 Hours**

Module-III

Advanced State Modeling, Interaction Modeling: Advanced State: Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models.

Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models. **08 Hours**

Module-IV

Process Overview, System Conception, Application Analysis: Process Overview: Development stages; Development life cycle.

System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement.

Application Analysis: Application interaction model, Application class model, application state model, adding operations.

08 Hours

Module-V

System Design: Application Design and implementation modeling: Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.

08 Hours

Laboratory

Develop a mini-project for the following 12 exercises listed below,

1. To develop a problem statement.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identify the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9. Implement the Technical services layer.
10. Implement the Domain objects layer.
11. Implement the User Interface layer.
12. Draw Component and Deployment diagrams.

Suggested domains for Mini-project.

1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing

7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System

Course Outcomes:

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

- Construct models to Show the importance of systems analysis and design in solving complex problems
- Recognize the difference between various object relationships: inheritance, association, and dependency relationships.
- Represent an object-oriented system using a number of modeling views.
- Apply the role and function of each UML model in developing object-oriented software.
- Estimate System performance and construction of UML models and expressing the appropriate notation associated with each model.

Text Book:

1. Michael Blaha, James Rumbaugh: "Object-Oriented Modeling and Design with UML", 2nd Edition, Pearson Education, 2005, (Chapters 1,2,4-7,10,11,13,14,17), ISBN: 978-81317-1106-4.

Reference Books:

1. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: "UML 2 Toolkit", Wiley - Dreamtech India, 2004, ISBN: 978-0-471-46361-0.
2. Grady Booch: "Object-Oriented Analysis and Design with Applications", 3rd Edition, Pearson Education, 2007, ISBN-13: 978-0201895513.

E-Resources:

1. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_functional_modeling.htm
2. https://en.wikipedia.org/wiki/Object-oriented_analysis_and_design



Big Data (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI732	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Understand big data, types, benefits, industry examples for business intelligence.
- Understand NoSQL data models.
- Learn how to manage Nosql data with multiple databases.
- Understand Hadoop, map-reduce architecture and Fundamentals.
- Learn HBase, Cassandra, Cassandra Query language, data replication.

Syllabus

Module – I

Overview of Big Data: Defining Big Data, Big Data Types, Analytics, Industry Examples of Big Data, Benefits of Big Data, Crowd Sourcing Analytics, Indian Big Data companies. **07 Hours**

Module – II

NoSQL Data Management-1: Introduction to NoSQL, aggregate data models, aggregates, key, value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, version, Map reduce, partitioning and combining, composing map-reduce calculations. **08 Hours**

Module – III

NoSQL Data Management-2: Key Value Databases, Document Databases, Column Family Stores, Graph Databases. **08 Hours**

Module – IV

Basics of Hadoop: Understanding Hadoop features, Learning the HDFS and MapReduce architecture, Introducing Hadoop MapReduce, Understanding the Hadoop MapReduce fundamentals. **08 Hours**

Module – V

HBase and Cassandra: Introduction to HBase, Row-Oriented vs Column-Oriented data stores, HBase Architecture, Understanding HBase Data Model, Casandra: Introduction, Features of Cassandra, Data Replication in Cassandra, Cassandra Query language(CQL), Cassandra Data Model. **09 Hours**

Laboratory:**Exercise 1 --- HDFS**

Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system.

You will use the `hadoop fs` command when interacting with HDFS,

1. Review the commands available for the Hadoop Distributed File System:
2. Copy file `foo.txt` from local disk to the user's directory in HDFS
3. Get a directory listing of the user's home directory in HDFS
4. Get a directory listing of the HDFS root directory
5. Display the contents of the HDFS file `user/fred/bar.txt`
6. Move that file to the local disk, named as `baz.txt`
7. Create a directory called `input` under the user's home directory
8. Delete the directory `input` and all its contents
9. Verify the copy by listing the directory contents in HDFS:

Exercise 2 --- MapReduce

1. Create a JOB and submit to cluster
2. Track the job information
3. Terminate the job
4. Counters in MR Jobs with example
5. Map only Jobs and generic map examples
6. Distributed cache example
7. Combiners, Secondary sorting and Job chain examples

Exercise 3 --- MapReduce (Programs)

Using movie lens data

1. List all the movies and the number of ratings
2. List all the users and the number of ratings they have done for a movie
3. List all the Movie IDs which have been rated (Movie Id with at least one user rating it)
4. List all the Users who have rated the movies (Users who have rated at least one movie)
5. List of all the User with the max, min, average ratings they have given against any movie
6. List all the Movies with the max, min, average ratings given by any user.

Course Outcomes:

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

- Describe big data, types, and benefits and used cases from selected business domains.
- Explain NoSQL big data using data models.
- Use various databases like Key value, documents, etc.
- Explain Hadoop, perform map-reduce analytics using Hadoop
- Use Hadoop related tools such as HBase, Cassandra.

Text Books:

1. V K Jain: “BIG DATA and HADOOP”, 2017 Edition, Khanna Book Publishing, ISBN: 978-93-82609-13-1, (Chapters 1.2, 1.4, 1.5, 1.6, 1.16, 1.19, 1.20 and 6.1, 6.2, 6.4, 6.6, 6.8, 6.9, 6.11, 6.13, 6.14).
2. Pramod J. Sadalage, Martin Fowler: “NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence”, Addison-Wesley, ISBN: 9780133036121, (Chapters 2-4,8-11).
3. Vignesh Prajapati: “Big data analytics with R and Hadoop”, 2013, SPD, ISBN-13: 978-93-5110-410-0, (Chapters 1,2).

Reference Books:

1. Tom White: “Hadoop: The Definitive Guide”, 3rd Edition, O’Reilly, 2012.
2. Lars George: “HBase: The Definitive Guide”, O’Reilly, 2011.

E-Resources:

1. <http://www.tutorialspoint.com/hadoop/>
2. http://www.sas.com/en_us/insights/big-data/what-is-big-data.html



Web Technologies – Servlet, JSP (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI733	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Understand the concepts of Web Technologies.
- Understand what are Web Servers and App Servers, and their differences.
- Understand Request and Response models.
- Understand how to build e-commerce applications using Servlets and JSP.
- Understand what EL and EL Tags are, and their usage in developing dynamic web pages.

Syllabus

Module – I

Introduction to Web Technologies: JEE, PHP, ASP and .Net

Introduction Web Dev environment: App Server, Web Server, 2-Tier and 3 -Tier Architecture.

Introduction to Servlet: Introduction to JEE containers, Application directory structure, Servlet Interface / Generic Servlet / HttpServlet, Servlet life cycle, Request and Response objects, Building sample application. **08 Hours**

Module – II

Inter Servlet Communication: RequestDispatcher, Include / Forward / Redirect, Building sample application.

Session Management: Creating & invalidating session, Different ways to handle session, Session time out configuration. **08 Hours**

Module – III

Introduction to JSP: Need for JSP, JSP life cycle. **06 Hours**

Module – IV

Introduction to EL: Need for EL and its advantages, Fundamentals of EL.

EL Tags: Core Tags, Introduction to MVC, Building sample application. **08 Hours**

Module – V

Project Work: Create an e-commerce application using the client-side languages, such as Bootstrap3, HTML5, CSS3, JavaScript and jQuery, along with the server-side Java language - Servlets and JSP. **10 Hours**

Laboratory

1. Programs covering Web Technologies, Web Dev environment, Servlet.
2. Programs covering Inter Servlet Communication, Session Management.
3. Programs covering JSP, Introduction to EL, EL Tags.

Course Outcomes:

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

- Analyze the concepts of Web Technologies.
- Compare Web Servers and App Servers.
- Implement Request and Response models.
- Demonstrate how to build e-commerce applications using Servlets and JSP.
- Design dynamic web pages using EL Tags.

Text Books:

1. Basham, Bryan, Sierra Kathy, Bates, Bert: “Head First Servlets and JSP”, 2nd Edition, Shroff, ISBN-10: 8184044976.
2. Santosh Kumar K: “JDBC 4.2, Servlet 3.1, and JSP 2.3 includes JSF 2.2 and Design Patterns, Black Book”, 2nd Edition, Dreamtech Press, ISBN-10: 9351199088.

Reference Book:

1. Budi Kurniawan: “Servlet & JSP: A Tutorial”, 2nd Edition, Brainy Software, ISBN-10: 1771970278.



System Modeling and Simulation

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST741	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Study the basic system concept and definitions of system.
- Understand the techniques to model and to simulate various systems.
- Acquire knowledge to analyze a system and to make use of the information to improve the performance.
- Understand the value of rapid prototyping for: requirements, potential design issues, modelling inputs.
- Understand the need for quantification and understand the limits of quantification.

Syllabus

Module – I

Introduction: When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. The basics of Spreadsheet simulation, Simulation example: Simulation of queuing systems in a spreadsheet. **08 Hours**

Module – II

General Principles, Simulation Software: Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; **08 Hours**

Module – III

Random-Number Generation, Random-Variate Generation: Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties. **08 Hours**

Module – IV

Input Modeling: Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models. **08 Hours**

Module – V

Verification, Calibration, and Validation; Optimization: Model building, verification and validation; Verification of simulation models; Calibration and validation of models, Optimization via Simulation. **08 Hours**

Course Outcomes:

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

- Explain the system concept and apply functional modelling method to model the activities of a static system;
- Apply the behaviour of a dynamic system and create an analogous model for a dynamic system;
- Assess and select a model for an engineering system taking into consideration its suitability to facilitate engineering decision making and predicted advantages over alternative models.
- Explain the simulation results of an engineering system model, within the context of its capabilities and limitations, to address critical issues in an engineering project.
- Manage expectation level of different stakeholders

Text Book:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: “Discrete-Event System Simulation”, (Chapters, 1-12), 5th Edition, Pearson Education, 2010, ISBN: 9789332518759.

Reference Books:

1. Lawrence M. Leemis, Stephen K. Park: “Discrete – Event Simulation: A First Course”, Pearson Education, 2006, ISBN: 9780132020565.
2. Averill M. Law: “Simulation Modeling and Analysis”, 4th Edition, Tata McGraw-Hill, 2007, ISBN: 9780070667334.

E-Resources:

1. <http://home.ubalt.edu/ntsbarsh/simulation/sim.htm>
2. <http://searchworks.stanford.edu/view/10091706>



Tax Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE751	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to :

- Familiarise the students with the significance of taxation system.
- Understand the structure of Indian Taxation system.
- Gain knowledge about the practical aspects of Indian taxation.
- Understand the system of computation of tax from Salaries.
- Sketch the recent trends in Indian taxation system.

Syllabus

Module – I

Introduction to taxation system, Objectives of taxation, Factors to be considered for tax planning Canons of taxation, Types of taxation, Direct tax, Indirect tax (Broad perspective only). **07 Hours**

Module – II

Taxation system in India, Types of taxes levied in India, Various heads of income tax (Broad outline only) Basic concepts in taxation, Assessment year, Financial year, assessee, Residential status, Tax liability **08 Hours**

Module – III

Income tax authorities in India, Constitution, Powers, Functions specimen of Form 16, Filing of returns, tax evasion, Penalties for contravening the provisions of income tax. **08 Hours**

Module – IV

System of computation of tax from salaries, Taxable income, Permissible deductions from 80C to 80U Fringe benefits exempted from tax, exempted income under section 10 of Income tax act. **10 Hours**

Module – V

Trends in Indian taxation system, Self assessment, PAN card, Budgetary provisions of the financial year 2017-18 on taxation, GST, Advantages, Problems in implementing GST, Measures to overcome the limitations of GST. **06 Hours**

Course Outcomes:

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

- Gain knowledge about the system of taxation prevailing in the country.
- Compute tax under different heads.
- Gain practical knowledge on filing returns.
- Calculate the payable tax for salaried individuals.
- Gain insight into recent practices on taxation.

Reference Books:

1. Dr. Vinod K. Singhania: “Direct taxes-Law and Practice”, Taxmann Publication.
2. Dr. Mehrotra, Dr. Goyal: “Direct taxes- Law and Practice”, Sahitya Bhavan Publication.
3. “7 lectures-Income tax-I “, VBH.
4. Swaminathan: “Income Tax”, KPH.
5. T.N.Manoharan: “Income tax including VAT”.
6. R.G.Saha, Ushadevi: “Taxation”, HPH.



Assessment of Building Energy Performance

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE752	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to :

- Provide a foundation for performing a building energy audit
- Perform assessment tasks on building energy performance
- Submit a Building EQ rating
- Understand the methods and processes to be performed in the field
- Know the process of certifying professionals in energy assessment

Syllabus

Module – I

Introduction, global energy consumption characteristics and the role of commercial and residential buildings, building energy end use consumption characteristics, impact of time variations in building energy consumption, Building mechanical, electrical, and lighting systems. **08 Hours**

Module – II

Anatomy of typical HVAC systems in commercial buildings , typical primary and secondary HVAC equipment and their role in meeting system requirements , basics of electrical distribution systems and their equipment in commercial buildings, basics of lighting system in buildings, including performance terminology, lighting technologies, energy performance, and the role of day lighting. **08 Hours**

Module – III

Introduction to building energy benchmarking and assessment , differences between benchmarking, labeling programs, and energy and environmental auditing, role of building type and climate zone on energy use, key aspects of ENERGY STAR® Portfolio Manager and other tools for benchmarking, ASHRAE Building EQ As Designed and In Operation ratings, differences between Building EQ and Portfolio Manager, Preliminary Energy Use Analysis (PEA). **08 Hours**

Module – IV

Measuring and monitoring building performance, instrumentation for measuring indoor environmental quality and building energy flows, Perform measurements of indoor environmental quality and building energy flows, accuracy of building

measurements, Identify the components of an ASHRAE Level 1 walk through survey and the differences between Level 1, 2, and 3 surveys, Indoor Environment Quality.

08 Hours

Module – V

Energy Efficiency Measures – Building Envelope and Lighting, role of building envelope characteristics on energy use, energy conservation and energy efficiency measures related to envelope and lighting characteristics, Energy Efficiency Measures – HVAC Systems, energy conservation and energy efficiency measures related to HVAC systems, financial analysis of expected improvements to HVAC systems. **08 Hours**

Course Outcomes:

On completion of the course, the student will be able to :

- Produce an ASHRAE Building EQ In Operation rating for the buildings provided in the class.
- Produce a listing of potential Energy Efficiency Measures (EEM) including financial payback analysis.
- Perform measurements of indoor environmental quality and HVAC system performance.
- Identify different building types and determine the impact of climate on energy use.
- Analyze raw energy consumption data from measured-meter readings.

Text Books:

1. ASHRAE Building Energy Quotient Program website.
2. ASHRAE BEAP certification study guide.
3. ASHRAE Standard 105-2014 Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emission.

Reference Books:

1. ASHRAE Performance Measurement Protocols for Commercial Buildings: Best Practices Guide.
2. ENERGY STAR® Portfolio Manager website.



Natural Disaster Mitigation and Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE753	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to :

- Understand the types of natural and environmental disasters.
- Develop skills in various stages of disaster preparedness, mitigation and management.
- Understand the methodologies for disaster risk assessment.

Syllabus

Module – I

Natural Disasters – Overview: Introduction- Natural Disasters around the world- Natural Disaster Risk Assessment- Earth and its characteristics Human Dimensions of Global environment Change – Disaster mitigation, preparedness, response and recovery comprehensive emergency management Early warning systems and Disaster Preparedness– Rehabilitation, Vulnerable Populations - Logistics and Services, Food, Nutrition and Shelter -Role of UN Red cross and NGOs. **08 Hours**

Module – II

Natural Hazards: Introduction and Review - Natural Disasters -Principles, Elements, and Systems - Geological-Geomorphological aspects, - Earthquake-Geology, Seismology, Characteristics and dimensions– Landslides- Human impact on the mountainous terrain and its relationship with Rainfall, liquefaction etc- Tsunami - Nature and characteristics. **08 Hours**

Module – III

Climate system aspects and Processes: Oceanic, Atmospheric and Hydrologic cycles - Severe Weather & Tornadoes , Cyclones, Floods and Droughts - Global Patterns - Mitigation & Preparation – Drought – Famine- nature and dimensions – Drought Assessment and Monitoring. **08 Hours**

Module – IV

Natural Disaster Communication: Mapping - Modeling, risk analysis and loss estimation – Natural disaster risk analysis - prevention and mitigation - Applications of Space Technology (Satellite Communications, GPS, GIS and Remote Sensing and Information / Communication Technologies (ICT) in Early warning Systems - Disaster Monitoring and Support Centre– Information Dissemination, mobile communication – etc. **08 Hours**

Module – V

Administrative mechanisms: Community and Social organizations – Education and Training – Establishment of capacity building among various stake holders – Government - Educational institutions – Use of Multi-media knowledge products for self education. **08 Hours**

Course Outcomes:

On completion of the course, the student will be able to :

- Learn about the types of natural and environmental disasters and its causes.
- Learn about organizational and Administrative strategies for managing disasters.
- Learn about the early warning systems, monitoring of disasters effect and necessity of rehabilitation.
- Learn about the engineering and non-engineering controls of mitigating various natural disasters.
- Understand the key roles of capacity building to face disaster among government bodies, institutions, NGO's, etc.
- Learn methodologies for disaster risk assessment with the help of latest tools like GPS, GIS, Remote sensing, information technologies, etc.

Text Books:

1. Kovach, Robert L :“Earth’s Fury: An Introduction to Natural Hazards and Disasters”, Englewood Cliffs, N.J., Prentice Hall, 1995.
2. Siddhartha Gautam, K Leelakrishna Rao: “Natural disaster Management”, 3rd Edition, 2012, ISBN: 9381604320.

Reference Books:

1. Arul Jothi, D L Balaji: “Safety And Disaster Management Education in Schools”, 1st Edition, Anmol Publications, 2009, ISBN: 9380252609.

E-Resources:

1. <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr/bt-dsstr-mtghtn-en.aspx>
2. www.nrdms.gov.in/natural_disaster.asp
3. <https://www.ncbi.nlm.nih.gov> › NCBI › Literature › Bookshelf



Small and Medium Enterprise Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE761	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to :

- Understand the various concepts of Entrepreneurship and familiarize them with the understanding of contemporary environment of MSMEs.
- Understand the business Environment to MSMEs.
- Understand the process of Enterprise Creation.
- Understand the effective Business Plan and Institutional Support Mechanism.
- Understand the concepts of marketing management in the MSMEs.

Syllabus

Module – I

Basic Aspects: Concept, nature of Entrepreneur and Entrepreneurship, Distinction between Entrepreneur and Manager, Entrepreneurship, Medium, Small and Tiny Business : Definition, Role in the economy and significance, Changing scenario of MSMEs in the era of Liberalization and Globalization, Competitiveness. **08 Hours**

Module-II

Environment assessment: Political, Legal, Economic, Social, Technological, Global environment, Assessment of business opportunities, Government initiatives and private sector opportunity. **08 Hours**

Module-III

Enterprise Creation: Starting a small industry, Entrepreneurial function or process of starting a new venture based on personal competencies, requirements to start a business venture, Feasibility of the project, Business incubators . **08 Hours**

Module-IV

Business Plan: Developing effective business plan-meaning, benefits of business plan, Timing of the business plan, Length of the business plan, composition of the business plan or detailed project report. Institutional Support Mechanism: District Industries Centre, State Directorate of Industries, SIDBI, NSIC, SISI, KSFC, KIADB, TECSOK.

08 Hours

Module-V

Small Business Marketing: Concept of Marketing, Scope of Marketing, Marketing Mix, Product Mix, Channels of Distribution, Market Segmentation, Role of Middlemen, Distribution Strategies, Sales Promotion, Advertising and Publicity, Packaging Strategies, Branding Strategies. **08 Hours**

Course Outcomes:

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

- Visualize the various concepts of Entrepreneurship and understand of current environment of MSMEs.
- Know the Business Environment with respect to MSMEs.
- Know the Process of Enterprise Creation.
- Prepare Business Plan and Understand the Institutional Support Mechanism.
- Know the marketing management with reference to MSMEs.

Text Books:

1. Shukla. M.B: “Entrepreneurship and Small Business Management”, Kitab Mahal, Allahabad, 2011.
2. Sahay A., V. Sharma: “Entrepreneurship and New Venture Creation”, Excel Books, New Delhi, 2008.
3. Lall, Sahai: “Entrepreneurship”, Excel Books, New Delhi, 2006.
4. S. Anil Kumar: “Small Business and Entrepreneurship”, I.K.International Publishing House Pvt. Ltd., 2008.
5. Kotler, Keller, Koshy, Jha: “Marketing Management”, 13th Edition, Pearson Education.

Reference Book:

1. Wickham, Phillip A: “Strategic Entrepreneurship”, Pitman, UK, 1998.



Occupational Safety and Health Administration

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE762	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to :

- Understand the occupational health and safety and sector specific occupational health and safety issues.
- Understand the socio-economic aspects of occupational health and safety.
- Understand the health screening measures.
- Understand the legal Provisions on Occupational Health and Safety.
- Understand the participatory Research and Occupational Health.

Syllabus

Module – I

Introduction to Occupational Health and Safety: Definition and Context of OHS, Objectives and Principles of OHS, Workplace and Health Occupational Health, Hygiene and Ergonomics.

Sector Specific Occupational Health and Safety Issues: Health and Safety Risks in Mining, Health Hazards in Electronic Industry, Health Hazards in Food Processing Industry, Health Hazards in Other Industries. **07 Hours**

Module – II

Socio-Economic aspects of Occupational Health and Safety: Women's occupational and health safety, Child labour issues in occupational health and safety, Health issues in the unorganized sector.

Basics of Preventive Techniques: Definition of Accident, Accident Analysis, Monitoring of Hazards, Reporting and Investigation of Accidents. **08 Hours**

Module – III

Health Screening Measures: Stages of Medical Examination, Occupational History, Pulmonary Function Test (PFT), Noise Induced Hearing Loss (NIHL). **07 Hours**

Module – IV

Legal Provisions on Occupational Health and Safety: Overview of existing OHS Legislations in India, The Factories Act, The Mines Act, The Workmen's Compensation Act, The Employee's State Insurance Act. **07 Hours**

Module-V

Participatory Research and Occupational Health: Philosophy of Participatory Research (PR) Analysis based on PR Methodologies Conducting Participatory Research for OHS. **07 Hours**

Course Outcomes:

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

- Develop the ability to know the occupational health and safety.
- Have the knowledge of the socio-economic aspects of occupational health and safety.
- Demonstrate purpose of health screening measures.
- Know the legal Provisions on Occupational Health and Safety.
- Participate in Research and Occupational Health.

References:

1. International Labour Organization. Mining: a hazardous work [Internet]. ; 2015 ([cited 2015 Feb 2]. Available from: http://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_124598/lang--en/index.htm
 2. Gyekye, S.A. Workers' perceptions of workplace safety: an African perspective. *Int J Occup Saf Ergon.* 2006;12:31–42. Crossref | PubMed | Scopus (4)
 3. Amponsah-Tawiah, K., Jain, A., Leka, S., Hollis, D., Cox, T. Examining psychosocial and physical hazards in the Ghanaian mining industry and their implications for employees' safety experience. *J Safety Res.* 2013;45:75–84. Crossref PubMed | Scopus (5)
 4. Owiredu D. Annual chamber of mines presidential review. 83rd Annual General Meeting of the Ghana Chamber of Mines [Internet]. 2011 [cited 2014 Mar 1]. Available from: <http://www.ghanachamberofmines.org>.
 5. Helliwell, J.F., Putnam, R.D. The social context of wellbeing. *Philos Trans R Soc Lond B Biol Sci.* 2004;35:1435–1446. Crossref | Scopus (550)
 6. Bhagawati, B. Basics of occupational safety and health. *IOSR J Environ Sci Toxicol Food Technol.* 2015;9:91–94.
 7. Amponsah-Tawiah, K., Dartey-Baah, K. Occupational health and safety: key issues and concerns in Ghana. *Int J Bus Soc Sci.* 2011;14:120–126.
- National Safety Council. Injury facts. NSC, Itasca (IL); 2004.



Animation and Multimedia Engineering

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE763	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to:

- Understand the basics of Animation.
- Understand computer animation using characters.
- Learn how to create quality animation characters.
- Learn about volume construction and action made from face, gestures.
- Understand Acting and Sketching techniques.

Syllabus

Module – I

Introduction to Animation: History of Animation, The Origins of Animation, Types of Animation, Terms used in Animation, Basic Principles of Animation.

Introduction to equipment required for Animation: Animator’s Drawing Tools, Rapid Sketching and Drawing, Developing Animation Character. **07 Hours**

Module – II

Developing the characters with computer animation: Anatomy and Body Language, 2-D virtual drawing for animation.

Motion studies: : Thumbnails, sequential movement drawing, drawing for motion. **08 Hours**

Module – III

Essentials and qualities of good animation characters: Three dimensional drawings of characters.

Skills and Basic proportions: Visual and creative development of an artist, how to draw gestures, Heads, Rotation in Arcs, Key Lines, Perspective. **08 Hours**

Module – IV

Volume Construction: Balance, Muscles, Light and shade.

Shape and Action: Hands and Legs, Foreshortening, Facial expressions. **08 Hours**

Module – V

Acting and Sketching techniques: Introduction to Acting, Modeling, Sketching from Acting, Sketching from live models, Introduction to Rapid Sketching Techniques, Sketching from Memory, live action. **09 Hours**

Course Outcomes:

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

- Recognize the basics of animation along the tools.
- Develop characters with computer animation.
- Develop 3D drawings of characters and acquire skills regarding basic level of sketching.
- Explain Foreshortening, Facial expressions.
- Develop small animation characters by using acting and sketching techniques.

Text Book:

1. Chris Patmore: “The Complete Animation course: The Principles, Practice and Techniques of Successful Animation”, (Chapters 1-10), Barons Educational Series New York, 2003, ISBN-13: 978-0764123993.

Reference Books:

1. Frank Thomas, Ollie Johnston: “The Illusion of Life by Walt Disney”, Abbeville Press, 1981.
2. Daniel Carter, Michael Courtney: “Anatomy for the Artist: A Comprehensive Guide to Drawing the Human Body, A Complete Guide”, 2011.

E-Resources:

1. [http:// www.animationmentor.com/](http://www.animationmentor.com/)
2. <https://www.blopanimation.com/animation-for-beginners/>
3. <https://robots.thoughtbot.com/css-animation-for-beginners>



Information and Network Security Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSL77	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Work on Open Source cutting edge tools to find solutions for the problems in the field of Information and network security,
- Understand what are the foundational theory behind information security,
- Analyze basic principles and techniques when designing a secure system,
- Study how today's attacks and defenses work in practice,
- Assess threats for their significance, and how to gauge the protections and limitations provided by today's technology.

Laboratory

1. Perform an experiment to grab a banner with telnet and perform the task using Netcat.
2. Using nmap,
 - 1) Find Open ports on a system
 - 2) Find machines which are active
 - 3) Find the version of remote OS on other systems
 - 4) Find the version of s/w installed on other system
(using nmap or any othe software)
3. Perform an experiment to demonstrate how to sniff for router traffic by using the tool Cain and Abel / Wireshark / tcpdump
4. Perform an experiment to demonstrate the use of DumpSec.
5. Perform a wireless audit of an access point / router and decrypt WEP and WPA. (Using NetStumbler or aircrack-ng)
6. Perform an experiment to sniff traffic using ARP poisoning
7. Demonstrate Intrusion Detection System (IDS) using any tool such as Snort or any other Software.
8. Install RootKit and study variety of options
9. Generate minimum 10 passwords of length 12 characters using OpenSSL command.
10. Setup a honey pot and monitor the honey pot on network.

11. Install JCrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures studied in theory Network Security and Management.
12. Install IPCop on a linux system and learn all the functions available on the software.

Course Outcomes

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

- Work on Open Source cutting edge tools to find solutions for the problems in the field of Information and network security
- Know which application runs on specific port, scan for open ports
- Able to capture and analyze network traffic
- Perform audit settings, detect intruders in the network
- Implement standard algorithms used to provide data confidentiality, integrity and Authentication.

Text Books:

1. William Stallings: “Network Security Essentials: Applications and Standards”, 3rd Edition, Pearson Education, 2007.
2. Michael E. Whiteman and Herbert J. Mattord: “Principles of Information Security”, 2nd Edition, Cengage Learning, 2005.

Reference Book:

1. Behrouz A. Forouzan, “Cryptography and Network Security”, Special Indian Edition, Tata McGraw-Hill, 2007.

E-Resources:

1. <https://www.nmap.org>
2. <https://www.advanced-port-scanner.com>
3. <https://www.openssl.org>



Android Application Development Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSL78	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Describe the Android SDK features and the Development Framework and understanding Activities.
- Create adaptive, responsive user interfaces that work across a wide range of devices.
- Perform background work and long-running tasks in Android applications.
- Know the concepts of Storing, sharing and retrieving data in Android applications.
- Learn how permissions, security and performance affect application. Finally, make sure your app is ready to share with the world, and publish it.

Part-A

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

1. Install Android Studio and Run Hello World
2. Create and Start Activity Lifecycle and Instance State
3. Create Implicit Intents
4. Make Your First Interactive UI Using Layouts and TextView Elements
5. Using An Options Menu
6. Create a RecyclerView
7. Drawables, Themes and Styles
8. Create an AsyncTask
9. Connect to the Internet
10. BroadcastReceiver
11. Set and retrieve shared preferences
12. Implement a simple content provider

Part-B

Develop a suitable application to implement the skills learnt in the theory and the exercises indicated in Part-A.

Course Outcomes

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

- Comprehend the basic features of Android Platform and Create Activities in Android.
- Demonstrate the design concepts of user interface using components, views and menus in Android.
- Create and use databases for Android Application.
- Implement messaging services in Android.
- Deploy mobile applications in various marketplaces for distribution.

Text Books:

1. Wei Meng Lee: “Beginning Android Application Development”, Wiley Publications.
2. Reto Meier: “Professional Android 4 Application Development”, Wiley Publications.

Reference Books:

1. Mark Murphy: “Beginning Android 3”, 1st Edition, Apress Springer India Pvt. Ltd., 2011, ISBN-13: 978-1-4302-3297-1.
2. Sayed Hashimi , Satya Komatineni, Dave MacLean; “Pro Android 4”, 1st Edition, Apress Springer India Pvt. Ltd., 2012, ISBN: 978-1-4302-3930-7.
3. Reto Meier: “Professional Android 2 Application Development”, 1st Edition, Wiley India Pvt.Ltd., 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>



Project Phase-I and Seminar

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSP79	0:0:6:0	3	100	3 Hours	FC

Phase	Activity	Credits
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.	3

Eighth Semester B.E. Syllabus

Phase	Activity	Credits
II	Design, Theoretical/experimental investigation and Mid-term seminar to review the progress of the work and documentation(Mid term report).	4
III	Completion of the project work, participation in the project exhibition, Submission of project report Final Internal seminar and demonstration, Publications.	4
	Evaluation and Viva-voce	5 + 5