



**NAGARJUNA**  
COLLEGE OF ENGINEERING & TECHNOLOGY

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

**2019-2020**

Department of Computer Science and Engineering  
**NAGARJUNA COLLEGE OF ENGINEERING & TECHNOLOGY**  
Mudugurki Village, VenkatagiriKote 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**

**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 centre of excellence by creating knowledge through research and industrial exposure in the area of Computer Science & Engineering.
- M3:** Developing communication skill, leadership qualities, team work & 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.

**III & IV Semesters**

***Scheme and Syllabus***

***With effect from Academic Year 2019-20***

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## **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.

#### **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 datastructure and suitable algorithms.

**Third Semester B.E. - Scheme**

Sl. No.	Course Code	Course	Teaching Dept.	Total Credits	L-T-P-S (Hrs/week)	Marks
1	18CSM31	Integral Transforms & Applications (IC)	CSE / ISE	4	3:0:2:0	100
2	18CST32	Fundamentals of Computation Engineering	CSE / ISE	4	4:0:0:0	100
3	18CST33	Data Structures using C	CSE / ISE	4	4:0:0:0	100
4	18CSI34	Analog and Digital Electronics (IC)	CSE / ISE	4	3:0:0:0	100
5	18CSI35X	Foundation Elective-I (IC)	CSE / ISE	4	3:0:0:0	100
6	18CSL36	Data Structures Laboratory	CSE / ISE	2	1:0:2:0	100
7	18CSH37	Career Skill Development Programme	S & H	2	1:0:2:0	100
8	18CPH38	Constitution of India and Professional Ethics and Human Rights	S & H	1	1:0:0:0	100
		<b>Total</b>		<b>25</b>	<b>20:2:8:0</b>	<b>800</b>

**Foundation Elective-I (IC)**

Sl. No.	Course Code	Course
1	18CSI351	Design of Dynamic Web Pages
2	18CSI352	Fundamentals of Multimedia
3	18CSI353	Unix and Shell Programming

IC – Integrated Course

L – Lecture

T-Tutorials

P-Practical

S – Self Study

### Fourth Semester B.E. - Scheme

Sl. No.	Course Code	Course	Teaching Dept.	Total Credits	L-T-P-S (Hrs/week)	Marks
1	18CSM41	Statistics and Probability Using R (IC)	CSE/ISE	4	3:0:2:0	100
2	18CST42	Design and Analysis of Algorithms	CSE/ISE	4	4:0:0:0	100
3	18CST43	Computer Organization and Architecture	CSE/ISE	4	4:0:0:0	100
4	18CSI44X	Foundation Elective-II (IC)	CSE/ISE	4	3:0:2:0	100
5	18EET45X	Engineering Elective-III	CSE/ISE	4	4:0:0:0	100
6	18CSL46	Design and Analysis of Algorithms Laboratory	CSE/ISE	2	1:0:2:0	100
7	18CSH47	Technical Report Writing & IRDP	S&H	2	1:0:2:0	100
8	18KAK38 / 18KAK38	Vyavaharika Kannada / Adalitha Kannada	S&H	1	1:0:0:0	100
<b>Total</b>				<b>25</b>	<b>21:0:8:0</b>	<b>800</b>

### Foundation Elective-II (IC)

Sl. No.	Course Code	Course
1	18CSI441	Introduction to Embedded Processors
2	18CSI442	Cloud Computing and Virtualization
3	18CSI443	Object Oriented programming using JAVA (IC)

### Engineering Elective-III

Sl. No.	Course Code	Course
1	18EET451	Renewable Energy Sources
2	18 EET452	Introduction to Cyber Security and Cyber Laws
3	18 EET453	Management Information Systems
4	18EET454	Environmental Air Pollution

IC – Integrated Course

L – Lecture

T-Tutorials

P-Practical

S – Self Study

## Integral Transforms and Applications (IC)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
18CSM31	3:0:2:0	4	CIE:50 SEE:50	3 Hours	BS

### Course Objectives:

This course will enable students to :

- Understand the basic calculations, array operations, for and while loops, plotting graphs using SCILAB commands
- Understand the Laplace transforms and inverse Laplace transforms of standard functions , periodic function and unit step functions
- Understand the inverse Laplace transforms of some standard functions and product of two functions
- Learn the Z- Transforms, Fourier Transforms and inverse Fourier Transforms

### Syllabus

#### Module - I

**SCILAB** : Introduction to SCILAB, and its family, Menus and toolbars, Types of windows and types of files, SCILAB Help system, Basic calculations in SCILAB, Basic variables, Functions-Elementary Mathematical, Built-in and User defined functions. Array operations, Matrix operations, Loops: for and while loops, condition statements- if then and if-then-else statements, plotting of graphs. **07 Hours**

#### Module – II

**Fourier Transform** : FourierTransform-Fourier Sine and CosineTransform, Finite Fourier Sine and CosineTransform, properties of Fourier transform, Convolution theorem and theirinverse transforms. **08 Hours**

#### Module – III

**Laplace transform** : Definition, Transforms of elementary functions, properties of Laplace transforms, transforms of periodic function, unit step function and unit impulse function. **08Hours**

#### Module – IV

**Inverse Laplace transforms and applications** : Inverse Laplace transforms for standard functions, convolution theorem and problems, applications, solution of linear differential equation with initial condition. **08 Hours**

## Module – V

**Z- Transforms** : Definition, Some standard Z-transforms, Linearity property, Damping rule, some standard results, Shifting rule, Initial value and final value theorems-problems, Inverse Z-transform. Applications of Z-transforms to solve difference equations. **08 Hours**

### Course Outcomes:

On completion of this course the students are able to

- Understand the SCILAB commands to solve the various types Engineering problems
- Compute the Fourier and inverse Fourier Transforms.
- Apply the Acquired knowledge to find Laplace transforms of some functions
- Solve the linear differential equation with initial conditions using inverse Laplace Transform
- Determine the solution of Difference Equations Using Z-Transforms

### Text Books:

1. Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters 21, 22, 23), Khanna Publishers, New Delhi, 42nd Edition, 2012, ISBN: 9788174 091956.
2. N.P. Bali and Dr. Manish Goyal: "A Text Book of Engineering Mathematics", (Chapters 18, 20, 23), Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2014, ISBN: 9788131808320.
3. SCILAB Group: "Introduction to SCILAB, A Users Guide" .

### Reference Books:

1. Erwin Kreyszig: "Advanced Engineering Mathematics", (Chapters 6, 11), Wiley Pvt. Ltd. India, New Delhi, 9th Edition, 2011, ISBN 13: 9788126531356.
2. B.V. Ramana: "Higher Engineering Mathematics", (Chapters 12, 20, 21), Tata McGraw – Hill Publishing company Limited, New Delhi, 2nd Reprint, 2010, ISBN 13: 978-0-07063419-0.

### E-Resources:

1. <http://bookboon.com/en/essential-engineering-mathematics-ebook>
2. <https://www.free-ebooks.net/ebook/essential-engineering-mathematics>
3. <https://www.scilab.org/resources/documentation/books>
4. <https://archive.org/details/AdvancedEngineeringMathematics10thEdition>
5. [https://mars.uta.edu/mae3183/simulation/introscilab\\_baudin.pdf](https://mars.uta.edu/mae3183/simulation/introscilab_baudin.pdf)

### List of SCILAB Experiments

Sl. No.	Name of the Experiment
1	SCILAB Environment
2	Basic operations in SCILAB
3	Basic Matrix operations
4	SCILAB programming environment
5	Use of Functions
6	Plotting of 2D and 3D Curves
7	Polynomial Evaluation and Determination of Roots of a Polynomial
8	Statistics using SCILAB
9	Differentiation and Integration using SCILAB
10	Numerical Methods using SCILAB



## Fundamentals of Computation Engineering

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CST32	4:0:0:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Understand the logical notation of fundamental concepts such as sets, relations and functions and semantics of propositional and predicate logic.
- Translate statements from a natural language into its symbolic structures in logic.
- Understand the basic concepts of graph theory.
- Learn how to use graphs as a powerful modeling tool to solve practical problems in various fields.
- Get familiarized with modeling of computational methods.

### Module - I

**Set Theory** : Sets and Subsets, Set Operations and the Laws of Set Theory, Counting and Venn Diagrams.

**Fundamentals of Logic** : Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic. **10 Hours**

### Module - II

**Fundamentals of Logic (Contd.)**: Rules of Inference, Quantifiers, Definitions and Proofs of Theorems. **10 Hours**

### Module – III

**Relations** : Cartesian Products and Relations, Properties of relations, Computer Recognition- Zero-One Matrices and Directed Graphs, Partial orders - Hasse diagrams, Equivalence relations and Partitions.

**Functions** : Functions –Plain and One-to-One, Onto Functions, Pigeon-hole principle, Function Composition and Inverse Functions. **10 Hours**

### Module – IV

**Introduction to Graph Theory** : Definitions and Examples, Subgraphs, Complements, and Graph Isomorphism, Vertex Degree, Euler Trails and Circuits, Hamilton Paths and Cycles. Graph Coloring, and Chromatic Polynomials.

**Trees** : Definitions, Properties, and Examples.

**11 Hours**

## Module – V

**Fundamental Principles of Counting** : The Rules of Sum and Product, Permutations, combinations – The Binomial Theorem, Combinations with Repetition.

**The Principle of Inclusion and Exclusion** : The Principle of Inclusion and Exclusion, Generalizations of the Principle. **11 Hours**

### Course outcomes:

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

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations and functions and develop the syntax and semantics of propositional and predicate logic.
- Prove and disprove results related to logic and define, compare and recognize relations.
- Define, compare and recognize relations and functions and identify relations and functions with graphs, tables and sets of ordered pairs.
- Apply the abstract concepts of graph theory in modeling and solving non-trivial problems in different fields of study.
- Demonstrate the ability to solve problems using counting techniques and combinatorics

### Text Book:

1. Ralph P. Grimaldi: “Discrete and Combinatorial Mathematics”, (Chapters 1-3, 5, 7, 8, 11, 12), Pearson Education, 5th Edition, 2006, ISBN: 8177584243, 9788177584240.

### Reference Books:

1. Kenneth H. Rosen: “Discrete Mathematics and its Applications”, McGraw Hill, New Delhi, 7th Edition, 2010, ISBN : 0073383090.
2. J K Sharma: “Discrete Mathematics”, Trinity, India, 4th Edition, 2015, ISBN: 978-93-5138-143-3.
3. D.S. Chandrasekharaiah: “Graph Theory and Combinatorics”, Prism, Bengaluru, 4th Edition, 2013, ISBN: 978-81-7286-698-3.
4. Richard A. Brualdi: “Introductory Combinatorics”, Pearson Education, India, 4th Edition, 2004, ISBN: 978-0-13-602040-0.

### E-Resource:

1. <https://www.pearsoned.co.in/grimaldidcm5e>



## Data Structures with C

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CST33	4:0:0:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to:

- Understand the basics of pointers and dynamic memory allocation.
- Learn concepts of structure and its application in programming.
- Gain knowledge to choose the specific linked lists for implementing real world problems.
- Grasp the use of stacks and queues in solving complex problems.
- Acquire knowledge of non linear data structure like trees.

### 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(). **10 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. **10 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. **10 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. **10 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. **10 Hours**

### 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.

### Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: “Introduction to Algorithms”, PHI Learning Private Limited-India, 3rd Edition, 2010, ISBN-13: 978-8120340077.
2. Aaron M. Tenenbaum: “Data Structures using C”, Pearson Education-India , 2nd Edition, 2003, ISBN-13: 978-8131702291.

### Course Outcomes:

On successful completion of this module, students should be able to:

- Choose pointers for effective programming.
- Analyze the use of structures over arrays in solving the real world problems.
- Use the appropriate data structure in context of solution of given problem.
- Perform operations like insertion and deletion on different types of data structures like stack and queues.
- Design and analyze programming problem statements using appropriate data structures like trees.

### 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-data-structures.php>
5. <https://www.cprogramming.com/algorithms-and-data-structures.html>

## Analog and Digital Electronics

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI34	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Know the different types of amplifiers constructed from BJTs and MOSFETs
- Understand applications of diode as clippers and clampers
- Apply the theoretical concepts through laboratory and simulation experiments
- Analyze Synchronous and Asynchronous counters
- Assess and design sequential circuits

### 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 Amplifiers** : Emitter-biased amplifier, Small-signal operation, AC Beta, AC resistance of the emitter diode, Two- transistor models, Analyzing an amplifier, Voltage gain. **08 Hours**

#### Module - II

**MOSFETs** : The Depletion-mode MOSFET, D-MOSFET curves, Depletion-mode MOSFET amplifiers, The enhancement-mode MOSFET, CMOS, E-MOSFET amplifiers.

**OP-AMPS in Waveform conversion and Generation Circuits:** Sine to rectangular, Rectangular to triangular, Triangular to pulse conversion circuits, Relaxation oscillator, Generating triangular waves. **08 Hours**

#### Module - III

**Combinational Logic Circuits:** Boolean laws and theorems, Sum-of-Products method, Truth table to Karnaugh map, Pairs, Quads, and Octets, Karnaugh simplifications, Don't-care conditions, Product-of-Sums method, Product-of-Sums simplifications, Simplification by Quine-McCluskey method, Introduction to HDL, HDL implementation models.

**Data-Processing Circuits:** Multiplexers, Demultiplexers, 1-of-16 Decoder, Encoders **08 Hours**

## Module - IV

**Flip-Flops** : Introduction, Edge triggered RS FLIP-FLOP, D FLIP-FLOP, JK FLIP-FLOP, T FLIP FLOP, JK Master-slave FLIP-FLOP, Conversion of FLIP FLOPS, Various representations of FLIP-FLOPs. **08 Hours**

## Module - V

**Registers:** Types of Registers, Applications of shift registers.

**Counters:** Asynchronous counters, Decoding gates, Synchronous counters, Changing the counter modulus, Decade counters, Counter design as a synthesis problem. **07 Hours**

### Lab Programs

1. Design and construct a suitable circuit and demonstrate the working of positive clipper, and clamper using diodes.
2. Design and implement relaxation Oscillator using OP-AMP to generate a rectangular wave from for a given frequency.
3. Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.
4. Design and implement a mod-n ( $n < 8$ ) synchronous up counter using J-K Flip-Flop and demonstrate its working.
5. Design and implement a ring counter using 4-bit shift register and demonstrate its working.
6. Demonstrate the working of the positive clipper and clamper circuits.
7. Build relaxation Oscillator using a simulation package and verify its waveforms.
8. Develop the Verilog / VHDL code for an 8:1 multiplexer. Simulate and verify its working.
9. Develop the Verilog / VHDL code for D Flip-Flop with positive-edge triggering. Simulate and verify its working.
10. Develop the Verilog / VHDL code for switched tail counter. Simulate and verify its working.

### Course Outcomes:

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

- Use diodes in clippers and clampers.
- Analyze and design transistor and MOSFET amplifiers in different configurations.

- Apply K-Map and Quine-McCluskey methods to simplify the given Boolean expressions.
- Design and implement registers using Flip-Flops.
- Design and develop counters using Flip-Flops.

### **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.
4. R D Sudhaker Samuel: “Illustrative Approach to Logic Design”, Sanguine-Pearson, New Delhi India, 2012, ISBN: 9788131765081.

### **E-Resources:**

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



## Design of Dynamic Web Pages (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI351	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable students to :

- Learn the evolution of the World Wide Web and its relevance in today's world and also, to comprehend HTML, CSS scripts to design web layouts.
- Get a clear understanding of the technologies like Java Script involved in developing UI for interactive web pages.
- Perceive jQuery libraries to simplify complicated tasks from JavaScript and DOM manipulation.
- Cognize Bootstrap framework with a focus on creating interactive and responsive web pages faster and easier
- Grasp the use of XML for developing applications over web.

### Syllabus

#### Module - I

**HTML 5 and CSS** : Introduction to Hyper Text Markup Language, Key components of HTML document, HTML elements, Headers, Linking, Images, Unordered Lists, and Nested and ordered Lists. Tables, Divs and forms: HTML Tables and Formatting, HTML Forms, Internal Linking, Creating and Using Images, Maps, Div and span tags. Introduction CSS, CSS selector, positioning, layouts, debugging. **11 Hours**

#### Module - II

**JavaScript** : Browser and Document object, scripts and HTML Document, variables, expressions, Data type conversions, decisions and loops, control structure, windows Document object, forms and form handling elements, scripting, event handling. **11 Hours**

#### Module - III

**jQuery** : Using selectors with jQuery, Manipulating page elements with jQuery, jQuery event model, jQuery animation and advanced effects, jQuery plugins. **10 Hours**

#### Module - IV

**Bootstrap** : Bootstrap Scaffolding, Bootstrap CSS, Bootstrap Layout Components, Bootstrap JavaScript Plugins, Using Bootstrap. **10 Hours**

## Module - V

XML: Introduction, Syntax, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS. **10 Hours**

### Hands on

#### 1. HTML and CSS -

- a. Create a HTML page to display the following content <Ensure the format is same as shwn below>; Use HTML Tables UnorderList and OrderList (UL and OL):

<p><b>1. Development Environment</b></p> <ul style="list-style-type: none"> <li>Eclipse (SpringSource Tool Suite distribution)</li> <li>Apache Tomcat/Vmware®vFabric™ tc Server</li> <li>Spring Insight</li> <li>Testing tools</li> </ul>	<p><b>2. Spring Overview</b></p> <ul style="list-style-type: none"> <li>Introduction to Spring configuration</li> <li>Bean life cycle</li> <li>Simplifying configuration</li> <li>Integration testing with Spring</li> </ul>
<p><b>3. Getting Started with Spring Web MVC</b></p> <ul style="list-style-type: none"> <li>Spring model-view-controller (MVC) overview</li> <li>DispatcherServlet</li> <li>Controller programming model overview</li> <li>Spring MVC views</li> <li>Simplifying configuration</li> </ul>	<p><b>4. Spring MVC Configuration Options</b></p> <ul style="list-style-type: none"> <li>Spring MVC infrastructure Beans</li> <li>URL mappings</li> <li>Handler interceptors and handler adapters</li> <li>Exception resolvers</li> <li>Message source</li> </ul>

- b. Create a HTML page to display testimonials received from customers along with their picture and Name as shown below:

“ This is an example testimonial. I can be long or short. Use it to display client testimonials or anything else that you see fit. You can add testimonials using shortcode on posts and pages and also by using widgets. Neat huh? ”

- Jane Doe



About Jane Doe  
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut quis quam eu turpis varius tempus. Quisque mollis, enim et fringilla venen, libero urna. Libero nunc, vehicula pharetra eu diam vel tellus.

“ This is an example testimonial. I can be long or short. Use it to display client testimonials or anything else that you see fit. You can add testimonials using shortcode on posts and pages and also by using widgets. Neat huh? ”

- Jane Doe



About Jane Doe  
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut quis quam eu turpis varius tempus. Quisque mollis, enim et fringilla venen, libero urna. Libero nunc, vehicula pharetra eu diam vel tellus.

“ This is an example testimonial. I can be long or short. Use it to display client testimonials or anything else that you see fit. You can add testimonials using shortcode on posts and pages and also by using widgets. Neat huh? ”

- Jane Doe



About Jane Doe  
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut quis quam eu turpis varius tempus. Quisque mollis, enim et fringilla venen, libero urna. Libero nunc, vehicula pharetra eu diam vel tellus.

“ This is an example testimonial. I can be long or short. Use it to display client testimonials or anything else that you see fit. You can add testimonials using shortcode on posts and pages and also by using widgets. Neat huh? ”

- Jane Doe



About Jane Doe  
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut quis quam eu turpis varius tempus. Quisque mollis, enim et fringilla venen, libero urna. Libero nunc, vehicula pharetra eu diam vel tellus.

## 2. Java Script and jQuery

a. jQuery form validations:

**Front-End:** Develop below form using HTML to create new user:



The image shows a web browser window titled "Create new user". Inside the window, there is a form with three input fields: "Name", "Email", and "Password". Above the "Name" field, there is a message: "All form fields are required." Below the "Name" field, there is a small vertical line indicating a validation error. At the bottom of the form, there are two buttons: "Create an account" and "Cancel".

### Field Details:

1. Name <String, Length(16), Mandatory, Validations: Minimum Length: 3, Can accept special characters>
2. Email <String, Length(60), Mandatory, Validations: Should be a valid email id>
3. Password <String, Length(16), Mandatory, Validations: Minimum Length: 5, Can accept special characters>

- Create Buttons - "Create an account" and "Cancel"

- Form should be Scrollable

- For field validations, use jQuery

- Ensure all validations pertaining to Name, Email and Password are taken care. If the user enters incorrect values appropriate error message should be displayed and should allow the user to enter correct data

### b. jQuery image slider :

In an HTML page, insert a minimum of 5 images; Ensure inserted images are scrollable.

Hint: To make images scrollable use jQuery image slider or use javascript.

Sample screen shot :



3. Develop below form using HTML to Search and Book Tickets:

### Search & Book Tickets

One Way       Round Trip

---

From:

To:

---

Onward(dd/mm/yyyy):

Return(dd/mm/yyyy):

---

Passengers:    Single Lady

[SEARCH AVAILABLE SERVICES](#)

[eBooking Procedure](#) | [Help](#)

Validations :

1. All fields are Mandatory except “Single Lady” Field
2. Onwards date must be less than Return date

4. Bootstrap, AJAX and jQuery:

- a. Create a Bootstrap Page that helps maintain Employee Information in an organization.

Employee Information					
<a href="#">View All Employees</a>					<a href="#">Add New Employee</a>
Name	Email	Mobile	Company	Est	Devs
Phya Mathar	phya.m@spare.com	9876512345	Virgin Technologies	<input type="checkbox"/>	<input type="checkbox"/>
Manjula Prasad	manjula.g@spare.com	9776512345	Virgin Technologies	<input type="checkbox"/>	<input type="checkbox"/>
Margal Rao	margal.g@spare.com	9776512332	Sparens Solutions Limited	<input type="checkbox"/>	<input type="checkbox"/>
Phya Rao	phya.g@spare.com	9876512132	Sparens Solutions Limited	<input type="checkbox"/>	<input type="checkbox"/>
Ajan Rao	ajan.g@spare.com	940012132	Sparens Solutions Limited	<input type="checkbox"/>	<input type="checkbox"/>

- b. When clicked on the “Add New Employee” button, load a dialog box as shown below



**Validations:**

1. All fields are Mandatory.
2. On successful submission of the form, the new employee details have to be appended as a last row in the table.
3. When clicked on the Edit icon, a similar pop-up as the “Add new Employee” form has to be displayed with the input fields populated with appropriate values. When the form is submitted in the Edit flow, ensure all the validations are in place. The name of the button in the Edit flow has to be “Update” instead of “Add”.
4. When clicked on the Delete icon, a confirmation dialog box has to be displayed with a message “Are you sure, you want to delete this entry?” If the user clicks “Yes”, the corresponding row has to be deleted from the table. If the user clicks “No” the table has to remain unaffected.

**Course Outcomes:**

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

- Develop web layouts with style sheets and web screens in a presentable form.
- Create interactive web pages through form validations using Java Script and other methods. Use the same in UI development.
- Use jQuery libraries to accelerate UI development with less effort.
- Design and develop responsive web pages faster using bootstrap framework.
- Develop applications by using synchronous and asynchronous communication 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://learn.jquery.com/>
3. [https://developer.mozilla.org/en-US/Learn/Getting\\_started\\_with\\_the\\_web/JavaScript\\_basics](https://developer.mozilla.org/en-US/Learn/Getting_started_with_the_web/JavaScript_basics)



## Fundamentals of Multimedia (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI352	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable students to :

- Understand the fundamental elements in multimedia.
- Learning the representations, perceptions and applications of multimedia.
- Software skills and hands on work on digital media will also be emphasized.

### Syllabus

#### Module - I

**Introduction** : What is multimedia, Components of multimedia, Web and Internet multimedia applications, Transition from conventional media to digital media, Usage of text in Multimedia, Families and faces of fonts, outline fonts, bitmap fonts International character sets and hypertext, Digital fonts techniques. **08 Hours**

#### Module - II

**Sound in Multimedia** : Importance of sound in Multimedia, Sound and its Attributes – tone, intensity, frequency, wavelength, pitch etc. Mono / Stereo Sound, Sound Channels, Effects in Sound, Analog / Digital Sound, Overview of Various Sound File Formats on PC WAV, MP3, Concept of MIDI, Software for sound editing and mixing 3D sound. **07 Hours**

#### Module - III

**Graphics in Multimedia** : Importance of Graphics in Multimedia, Vector and Raster Graphics, Image Capturing Methods Scanner, Digital Camera Etc. Various Attributes of Images- Size, Color, Bit Depth, Resolution etc, Various Image File Format BMP, DIB, EPS, PIC, and TIF Format Their Features and limitations . **07 Hours**

#### Module - IV

**Video in Multimedia** : Animation in Multimedia, Impact of Video in Multimedia, Basics of Analog Video, Digital Video, How to use video on PC, Brief note on various video standards PAL, NTSC,

Different file formats and their use in Multimedia, MPEG, AVI, MJPG, Name of video editing software, Basics of Animation, Types of Animation and use of Animation, Cell Animation, Computer Animation, Morphing Animation, Software for Creating Animations. **07 Hours**

## Module - V

**Applications of Multimedia and its Future :** Application of multimedia in different industries- Education, Entertainment, Journalism etc. Future of Multimedia, Career in Multimedia Production, Virtual Reality as new technology in multimedia, Applications of VR, Introduction to HMD, Boom cave, Introduction to various type:- Authoring Tools. **07 Hours**

### Experiments

1. Create an application in HTML to design the following page :

The application should allow the user to display information that lets the students to know about :

<b>Nagarjuna College of Engineering and Technology</b>	
<ul style="list-style-type: none"> <li>• NCET Courses</li> <li>• Syllabus</li> <li>• Duration</li> <li>• Examinations</li> <li>• Minimum Qualifications</li> <li>• New Batches</li> <li>• Feedbacks</li> </ul>	NCET is an autonomous body under VTU

- a) Apply unordered list with hyperlinks
  - b) Font type : Monotype Corsiva c) Font Size : 18, Font Color :Red
2. Create an application in HTML using forms that lets the users to fill-in their personal information/resume and submit the same.
  3. Create a simple animation (for eg: an animated face showing the movements of eyes and a smiling face) by using Macromedia Flash. Use the various Flash techniques
  4. Create a scene to show the effects of morphing by changing a running tiger into the image of a motor bike. Use different key frames to show the image of a tiger in the first frame and a motor bike in the last frame.
  5. A mask is a special type of layer that lets you reveal selected parts of another layer, Create a mask to show the following features :
    - a) People walking around inside a house,
    - b) They should be visible when they pass by a window, but invisible otherwise.
    - c) Use masking techniques to create a spotlight or showing pictures behind images.

6. Create an application to create an animated scene where
  - a) A person is being chased by some animal
  - b) Use the concept of layers consisting of
    - i) a background image,
    - ii) a series of images of a running man and
    - iii) a series of images of a running animal.
  - c) Integrate the layers to generate the effect of an animated scene.

### Course Outcomes:

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

- Understand the technologies behind multimedia applications
- Master the skills for developing multimedia projects.
- Summarize the key concepts in current multimedia technology.
- Create quality multimedia software titles.

### Text Books:

1. Tay Vaughan, "Multimedia making it work", Tata McGraw-Hill, 2008.
2. Rajneesh Aggarwal & B. B Tiwari, "Multimedia Systems", Excel Publication, New Delhi, 2007.
3. Li & Drew, "Fundamentals of Multimedia", Pearson Education, 2009.

### Reference Books:

1. Parekh Ranjan, "Principles of Multimedia", Tata McGraw-Hill, 2007
2. Anirban Mukhopadhyay and Arup Chattopadhyay, "Introduction to Computer Graphics and Multimedia", Second Edition, Vikas Publishing House.



## UNIX and Shell Programming (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI353	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable students to :

- Learn basic commands to interact with UNIX System and VI editor.
- Understand the history, origin, features and architecture of UNIX Operating System.
- The usage of various commands in UNIX environment.
- Develop the ability to evaluate regular expressions and use them for pattern matching.
- Apply essential facets of SHELL programming in order to solve the SHELL script problems.

### Syllabus

#### Module - I

**INTRODUCTION** : The UNIX operating system, Linux and GNU, The UNIX architecture, features of UNIX, POSIX and Single UNIX specification, Internal and External commands, Command structure, man browsing and manual pages on-line.

**File System** : The parent – child relationship, the HOME variable, pwd, cd, mkdir, absolute pathname, relative pathname. **08 Hours**

#### Module – II

**Vi editor** : Basics, input mode, saving text and quitting, searching for a pattern (| and ?), substitution- search and replace(:s).

**Basic file attributes** : ls: listing directory contents, the UNIX file system, ls -l, -d option, file ownership, file permissions, chmod, directory permissions, changing file ownership.

**More file attributes** : File systems and inodes, hard links, symbolic links and ln, the directory, umask, modification and access times, find. **08 Hours**

#### Module – III

**Process basics** : ps: process status, system processes(-e or -a), mechanism of process creation, process states and zombies, running jobs in background, nice:job execution, job control.

**Simple filters** : pr, head, tail, cut, paste, sort, uniq, tr. Filters using regular expressions – grep and sed: grep, Basic Regular Expressions (BRE), Extended Regular Expressions (ERE) and egrep. **08 Hours**

### Module – IV

**Simple filters** : sed: the stream editor, line addressing using multiple instructions (-E and -F) context addressing, writing selected lines to a file (w), text editing, substitution (s), basic regular expression revisited.

**The shell** : The shell's interpretive cycle, shell offerings, pattern matching, escaping and quoting, redirection, pipes, tee, command substitution, shell variables. **08 Hours**

### Module – V

**Essential shell programming** : Shell scripts, read using command line arguments, exit and exit status of command, the logical operators and ||, the if conditional, using test and {} to evaluate expression. The case conditional, expr, \$0, while, for, debugging. **08 Hours**

#### LABORATORY

1. Non-recursive shell script that accepts any number of arguments and prints them in the Reverse order, (For example, if the script is named rargs, then executing rargs A B C should produce C B A on the standard output).
2. Shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions are identical, outputs the common permissions, otherwise outputs each file name followed by its permissions.
3. Shell script that accepts path names and creates all the components in that path names as directories. For example, if the script name is mpe, then the command mpe A/B/C/D should create directories A, A/B, A/B/C, and A/B/C/D.
4. Shell script that accepts valid login names as arguments and prints their corresponding home directories. If no arguments are specified, print the suitable message.
5. Shell script that takes a valid directory names as an argument and recursively descends all sub directories, find the maximum length of any file in that hierarchy and prints this maximum value to standard output.
6. Shell script that accepts file names specified as arguments and creates a shell script that contains this file as well as the code to recreate these files. Thus if the script generated by your script is executed, it would recreate the original files (This is same as the "bundle" script described by Brain W. Kernighan and Rob Pike in " The Unix Programming Environment", Prentice – Hall India).
7. Shell programming of execute multiple shell commands using suitable like ls -l, ps -f, date, cal etc.

**Course Outcomes:**

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

- Describe history, origin, feature and architecture of UNIX operating system.
- Interact with UNIX system easily.
- Construct and edit files, search for any patterns using regular expressions.
- Solve complex jobs using tools and utilities available in UNIX.
- Design and develop various tasks by using Shell scripting.

**Text Book:**

1. Sumitabha Das: "UNIX – Concepts and Applications", (Chapters 1,2,4,6-9,11-14,17,19), Tata McGraw Hill, Noida, 4th Edition, 15th Reprint, 2011, ISBN-13: 978-0-07-063546-3.

**Reference Books:**

1. Behrouz A. Forouzan and Richard F. Gilberg: "UNIX and Shell programming", Cengage Learning, India, 1st Edition, 2005, ISBN: 81-35-0325-9.
2. M G Venkatesh Murthy: "UNIX and Shell programming", Pearson Education, Delhi, 1st Edition, 2005, ISBN: 81-7758-745-5.

**E-Resources:**

1. <http://www.mhhe.com/das/uca>
2. [http://www.tutorialspoint.com/unix/unix\\_tutorials.pdf](http://www.tutorialspoint.com/unix/unix_tutorials.pdf).
3. <http://www.perldoc.perl.org/>



## Data Structures with C Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSL36	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Understand the concepts of structures and pointers.
- Learn the various data structures like stack and queue.
- Understand prefix, infix, postfix expressions using stack data structure.
- Learn the operations of linked lists.
- Understand tree data structure.

Design, develop and implement the specified algorithms for the following problems using C language in LINUX environment.

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.

### Course Outcomes:

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

- Describe the concepts of structures and pointers.
- Explain and illustrate the various data structures like stack and queue.
- Implement and analyze prefix, infix, postfix expressions using stack data structure.
- Interpret and design the programs using linked lists.
- Implement binary trees.

### Text Books:

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed : "Fundamentals of Data Structures in C", (Chapters 1,2,3,4,5,6,9,10), 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.

**Reference Books:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: “Introduction to Algorithms”, PHI Learning Private Limited-India, 3rd Edition, 2010, ISBN-13: 978-8120340077.
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-data-structures.php>
5. <https://www.cprogramming.com/algorithms-and-data-structures.html>



## Career Skill Development PROGRAMME

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSD37	1:0:2:0	1	CIE:50 SEE:50	3 Hours	S&H

### Course Objectives:

This course will enable students to :

- Implement English vocabulary at command and ensure language proficiency.
- Achieve better Technical writing and Presentation skills Identify the common errors in speaking and writing English.
- Acquire Employment and Workplace communication skills.
- Augment LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred.

### Syllabus

#### Module – I

Introduction, Leaving taking, Request for Repetition, Asking for Information, Complaining, Asking about Preferences, Agreeing and Disagreeing, Starting a conversation with a stranger, Making Requests, Expressing Gratitude, Complimenting and Congratulating, Apologizing and Responding an Apology, Expressing Sympathy, Seeking Permission, Offering to Help, Ending a Conversation. **05 Hours**

#### Module – II

Oral Presentation, IT Extempore / Public speaking. **05 Hours**

#### Module – III

Story telling, debating. **06 Hours**

#### Module – IV

Mock interview, Telephonic Interview, Group Discussion, Personal Interview, Employment Interview, Dialogues in Various Situations. **05 Hours**

#### Module – V

Non-Verbal Communication skills(Body Language), Communication at Workplace Interpersonal Communication skills. **05 Hours**

**Course Outcomes:**

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

- Identify common errors in spoken and written communication
- Get familiarized with English vocabulary and language proficiency
- Improve nature and style of sensible writing and acquire employment and workplace communication skills
- Improve their Technical Communication Skills through Technical Reading and Writing practices
- Perform well in campus recruitment, engineering and all other general competitive examinations

**Text Book:**

1. S.L.N. Sharma, K. Shankaranarayana: “Basic Grammar”, Navakarnataka Vinyasa Pvt. Limited.

**Reference Books:**

1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2018. Refer it’s workbook for activities and exercises — “Communication Skills — I (A Workbook)” published by Oxford University Press—2018.
2. English Language Communication Skills (Lab Manual cum Workbook), Cengage learning India Pvt Limited [Latest Revised Edition]—2018. Reference Books.
3. English for Technical Communication by N.P.Sudharshana and C.Savitha, Cambridge University Press— 2016.



# Constitution of India, Professional Ethics and Human Rights

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CPH38	1:0:0:0	1	CIE:50 SEE:50	2 hours	HSS

## Course Objectives:

This course will enable students to :

- The basic information about Indian constitution.
- The fundamental rights and duties of a citizen.
- Special privileges of socially and economically weaker sections of the society.
- Individual role and ethical responsibility towards society.

## Syllabus

### Module – I

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution, Fundamental Rights & its limitations. **03 Hours**

### Module – II

Directive Principles of State Policy & Relevance of Directive Principles of State Policy, Fundamental Duties. Union Executives – President, Prime Minister, Parliament, Supreme Court of India. **03 Hours**

### Module – III

State Executives – Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd , 44th , 74th , 76th , 86th & 91st Amendments. **02 Hours**

### Module – IV

Special Provision for SC & ST, Special Provision for Women, Children & Backward Classes, Emergency Provisions. Human Rights- Working of National Human Rights Commission in India, Powers and functions of Municipalities, Panchayats and Co - Operative Societies. **03 Hours**

### Module – V

Scope & Aims of Engineering Ethics, Responsibility of Engineers, Impediments to

### 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 society.
- Exhibit Engineering ethics and responsibilities of Engineers.

### Text Books:

1. Durga Das Basu, "Introduction to the Constitution of India", Lexis Nexis Publications; 22<sup>nd</sup> Edition, 2015, ISBN-13: 978-9351434467.
2. Charles E. Haries, Michael S Pritchard and Michael J. Robins, "Engineering Ethics", Thomson Wadsworth, 2<sup>nd</sup> Edition, 2003, ISBN-13: 978-9812436764.

### Reference Books:

1. M.V. Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002, 1<sup>st</sup> Edition, ISBN-13: 978-8125918325.
2. M. Govindarajan, S. Natarajan, V.S. Senthilkumar, "Engineering Ethics", PHI Learning Private Limited, New Delhi, 2<sup>nd</sup> Edition, 2013, ISBN-13: 978-8120348165.
3. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI Learning Private Limited, New Delhi, 7<sup>th</sup> Edition, 2015, ISBN-13: 978-8120350892.

### E-Resources:

1. <http://www.cgsird.gov.in/constitution.pdf>
2. <http://indiacode.nic.in/coiweb/welcome.html>



## Statistics and Probability using R (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSM41	3:0:2:0	4	CIE:50 SEE:50	3 Hours	BS

### Course Objectives:

This course will enable students to :

- Learn to use the R-software.
- Understand the concept of different probability distributions.
- Learn the concept of stochastic process.
- Gain the knowledge of sampling of large data.

### Syllabus

#### Module – I

**Introduction to R-Lab** : Introduction to R, Basic Data types, vector operations, matrix construction, lists, data frames, Elementary statistics with R-Qualitative and quantitative data, numerical measures, probability distribution, interval estimation and simple linear regression. **07 Hours**

#### Module – II

**Probability and Distributions** : Random variables (Discrete and continuous), probability density function, cumulative density function, probability distributions-Poisson distribution, Geometric distribution, Exponential & Normal distribution -problems. **08 Hours**

#### Module – III

**Joint Probability** : Joint probability distribution, discrete and continuous distribution independent random variables, expectation, covariance, correlation coefficient. **08 Hours**

#### Module – IV

**Stochastic Process** : Classification of stochastic process, Bernoulli process, Poisson process probability vectors, stochastic matrices, fixed point matrices, regular stochastic matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states. **08 Hours.**

#### Module – V

**Sampling and inference** : Sampling distribution, Standard error, testing of hypothesis, level of significance, confidence limits, Test of significance of large samples, comparison of large samples, sampling of variables, central limit theorem, confidence limits for unknown means, students t-distribution. **08 Hours**

### Course Outcomes:

On completion of this course the students are able to

- Use R software to solve various engineering problems.
- Apply probability distributions to real time problems.
- Apply joint probability to real time problems
- Apply different process models in solving engineering problems
- Analyze the large data using sampling techniques.

### Text Books:

1. Dr.B.S.Grewal:“HigherEngineeringMathematics”,(Chapters:26,27),KhannaPublishers,NewDelhi, 44thEdition,2017,ISBN.:978-81-933284-9-1
2. B.V.Ramana:“HigherEngineeringMathematics”,(Chapters26,27,28,2931),TataMcGraw–HillPublishingCompanyLimited,NewDelhi,11thReprint,2010,ISBN13:978-0-07063419-0.

### Reference Books:

1. N.P.Bali:”EngineeringMathematics”,(Chapters:21),LaxmiPublications,9thEdition,2017, ISBN.:978-81-318-0832-0

### 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>

### List of Lab Experiments

- 1 Introduction to R Software and basic commands
- 2 Demonstration and operations of Vectors
- 3 Operations of Matrices
- 4 Demonstration of Lists
- 5 Demonstration of Data Frames
- 6 Qualitative Data Analysis
- 7 Quantitative Data Analysis
- 8 Numerical Measures of Data
- 9 Probability Distribution
- 10 Linear Regressions



## Design and Analysis of Algorithms

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CST42	4:0:0:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Acquire the knowledge of Algorithm and problem solving technique.
- Learn how to analyze the complexity of an algorithm in terms of time and space.
- Understand different techniques like divide and conquer, decrease and conquer etc., to solve problems.
- Understand different techniques like dynamic programming.
- Describe the limitations of algorithms.

### Syllabus

#### Module - I

**Introduction** : What is an algorithm? Fundamentals of algorithmic problem solving, Fundamentals of the analysis of algorithm efficiency, Asymptotic Notations and basic efficiency classes, Mathematical Analysis of Non-Recursive and Recursive Algorithms  
**Brute Force Approaches**: Introduction, Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching. **10 Hours**

#### Module - II

**Divide and conquer** : Divide and Conquer: General Method, Binary Search, Merge Sort, Quick Sort and its performance.

**The greedy method** : The General Method, Job Sequencing with Deadlines, Minimum- Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm, Single Source Shortest Paths. **10 Hours**

#### Module - III

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

**Transfer and conquer** : Introduction, Balanced search trees, Heap and Heap sort. **10 Hours**

#### Module - IV

**Space-Time Trade-offs** : Introduction, Sorting by Counting, Input Enhancement in String Matching (Horspool algorithm).

**Dynamic programming** : The General Method, Warshall's Algorithm, Floyd's

Algorithm for the All-Pairs Shortest Paths Problem, The Travelling Salesperson problem, Computing a Binomial co-efficient. **10 Hours**

### Module - V

**Limitations of algorithmic power and coping with them :** Lower-Bound Arguments, Decision Trees.

**Backtracking :** n - Queens problem, Subset – Sum Problem.

**Hashing :** Introduction, Open hashing, Closed hashing.

**Branch and bound :** Assignment problem, Knapsack problem. **10 Hours**

### Course Outcomes:

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

- Identify asymptotic notations and basic efficiency classes.
- Solve problems using various techniques like greedy and divide-and-conquer.
- Compute problems using various techniques like decrease-and-conquer and transfer-and-conquer.
- Use different algorithms like TSP, Floyd’s etc. to solve real world problems.
- Develop solutions for n - Queens problem, Subset – Sum Problem, Assignment problem, Knapsack problem etc.

### Text Books:

1. Anany Levitin: “Introduction to The Design and Analysis of Algorithms”, (Chapters 1-5,7,9,11), Pearson Education, Delhi, 2nd Edition, 2007, ISBN: 9780321358288.
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>

## Computer Organization and Architecture

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CST43	4:0:0:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Become familiar with the basics of computer structure and its performance.
- Learn basics of assembly language programming.
- Understand connections of peripheral devices and interrupts generated by them.
- Understand the basics of data communication by using different types of buses.
- Learn internal structure of memory and CPU..

### Syllabus

#### Module - I

**Basic architecture of Computers** : Computer Types, Functional Units, Basic Operational Concepts, computer architecture block diagram, Bus architecture, Performance -Processor Clock, Basic Performance Equation, pipelining, Clock Rate, Instruction set, Performance Measurement, Historical Perspective. **09 Hours**

#### Module – II

**Machine Instructions and Programs** : Numbers Arithmetic operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Generic Addressing Mode Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions Encoding of Machine Instructions. **10 Hours**

#### Module - III

**Input/ Output Organization and Bus Architecture** : Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O.

Interfaces – PCI Bus architecture, Read operation of PCI Bus, Signals on PCI Bus, SCSI Bus, USB architecture, USB Protocols, Input and Output Signals. **11 Hours**

#### Module - IV

**Memory System and Architecture** : Basic Concepts, Semiconductor RAM Memories and architecture, Structure of Larger Memory, Memory system Consideration, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions,

Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage.

**10 Hours**

### Module - V

**Architecture of Arithmetic circuits :** Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, architecture of multiplier circuits, Signed Operand multiplications, Fast Multiplications and Design and architecture of carry save adder, Integer Division, architecture of binary division, Floating-point Numbers and Operations, Float Point Operation, architecture of floating Point addition and subtraction unit.

**10 Hours**

### Course Outcomes:

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

- Focus on the function and design of various components necessary to process information digitally.
- Develop interface circuit between hardware and software, and emphasizes the structure and behavior of the system.
- Demonstrate the arrangement of external devices to utilize the processor efficiently.
- Interpret signals transmission between memory and processor by using standard buses like PCI, SCSI and USB.
- Design arithmetic circuits to perform simple mathematical operations.

### Text Book:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: "Computer Organization", (Chapters 1,2,4-6) TMH, Mcgraw-Hill College Division, 5th Edition, 2002, ISBN :9781259005275.

### Reference Books:

1. William Stallings: "Computer Organization and Architecture", PHI, Pearson Education, Delhi, 10th Edition, 2016, ISBN: 9780134101613.
2. David. A. Patterson, John L. Hennessy: "Computer Organization and Design The Hardware / Software Interface", ARM Edition, 5th Edition, Elsevier, 2014, ISBN: 97801240776263.

### 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>

## Introduction to Embedded Processors

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI441	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Understand the basics of 8086 microprocessor family and features
- Learn 8086 instruction sets as needed to solve programming problems
- Analyze how 8086 responds to interrupts, how interrupts-service procedures are written and how peripheral devices operate
- Expose architecture of 8086 microprocessor and ARM processor
- Familiarize instruction set of ARM processor

### Syllabus

#### Module - I

**The x86 microprocessor** : Microprocessor Evolution, Main features of 8086, 8086 Pin Diagram/Description, 8086 Internal Architecture, Introduction to Programming the 8086. **07 Hours**

#### Module - II

**8086 Assembly Language Programming** : Data Transfer Instructions, Arithmetic Instructions, Bit Manipulation Instructions, String Instructions, Program Execution transfer Instructions, Processor Control Instructions. **09 Hours**

#### Module - III

**Interrupts and Interfacing** : 8086 Interrupts and Interrupt Responses, 8259A Priority Interrupt Controller, Programmable Parallel Ports and Handshake Input/Output: Methods of Parallel Data Transfer, 8255A Internal Block Diagram and System Connections, Constructing and Sending 8255A Control Words. **08 Hours**

#### Module - IV

**Microcontrollers, ARM Embedded Systems** : Introduction to Microcontrollers, Microprocessors versus Microcontrollers, The RISC Design Philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. **07 Hours**

#### Module - V

ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline,

## Laboratory Programs

### Software Programs: Part A

1. Design and develop an assembly program to sort a given set of 'n' 16-bit numbers in ascending order. Adopt Bubble Sort algorithm to sort given elements.
2. Develop an assembly language program to reverse a given string and verify whether it is a palindrome or not. Display the appropriate message.
3. Develop an assembly language program to compute nCr using recursive procedure. Assume that 'n' and 'r' are non-negative integers.
4. Design and develop an assembly language program to read the current time and Date from the system and display it in the standard format on the screen.
5. To write and simulate ARM assembly language programs for data transfer, arithmetic and logical operations (Demonstrate with the help of a suitable program).
6. To write and simulate C Programs for ARM microprocessor using KEIL (Demonstrate with the help of a suitable program)

**Note: To use KEIL one may refer the book: Insider's Guide to the ARM7 based microcontrollers, Hitex Ltd.,1st Edition, 2005**

### Hardware Programs: Part B

7. Design and develop an assembly program to read the status of two 8-bit inputs (X & Y) from the Logic Controller Interface and display X\*Y.
8. Design and develop an assembly program to display messages "FIRE" and "HELP" alternately with flickering effects on a 7-segment display interface for a suitable period of time. Ensure a flashing rate that makes it easy to read both the messages
9. Design and develop an assembly program to drive a Stepper Motor interface and rotate the motor in specified direction (clockwise or counter-clockwise) by N steps (Direction and N are specified by the examiner).
10. Design and develop an assembly language program to a. Generate the Sine Wave using DAC interface (The output of the DAC is to be displayed on the CRO).

### Course Outcomes:

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

- Discuss microprocessor evolution and 8086 internal architecture.
- Describe functions of different types of 8086 assembly language instructions and use assembly language program to solve simple problems.
- Explain 8086 interrupt types and their applications.

- Differentiate between microprocessors and microcontrollers.
- Gain the knowledge for interfacing various devices to x86 family and ARM processor.

### Text Books :

1. Douglas V Hall: "Microprocessors and Interfacing", (Chapters 1,2,3,6,9,10), TMH, New Delhi, Third Edition, 2012, ISBN(13):9781259006159
2. Andrew N Sloss, Dominic Symes and Chris Wright: "ARM System Developers Guide", Elsevier, Morgan Kaufman publishers, 2017, Indian Reprint ISBN:9781259006159

### Reference Books:

1. Barry B Brey: "The Intel Microprocessors", Pearson Education, New Delhi, 8th Edition, 2009, ISBN(13):978-8131726228.
2. K. Udaya Kumar & B.S. Umashankar: "Advanced Microprocessors & IBM-PC Assembly Language Programming", TMH, 2003.
3. Joseph Yiu: "The Definitive Guide to the ARM Cortex-M3", 2nd Edition, Newnes, 2009.
4. The Insider's Guide to the ARM7 based microcontrollers, Hitex Ltd. 1st Edition, 2005.
5. ARM System-on-Chip Architecture, Steve Furber, Second Edition, Pearson, 2015.
6. Lyla B Das: "Architecture, Programming and Interfacing of Low power Processors-ARM7, Cortex-M and MSP430", Cengage Learning, 1st Edition.

### E-Resources:

1. <http://www.nptel.ac.in/downloads/106108100/>
2. <https://www.google.co.in/search?tbo=pandtbn=bksandq=inauthor:%22Douglas+V.+Hall%22>
3. <https://www.google.co.in/search?tbo=pandtbn=bksandq=inauthor:%22Douglas+V.+Hall%22#tbn=bksandq=Bary+b+brey>
4. [http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher\\_Slides/mod1/M1L3.pdf](http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/M1L3.pdf)
5. <http://www.nptel.ac.in/downloads/106108100/>
6. <https://www.google.co.in/search?tbo=pandtbn=bksandq=inauthor:%22Douglas+V.+Hall%22>
7. <https://www.google.co.in/search?tbo=pandtbn=bksandq=inauthor:%22Douglas+V.+Hall%22#tbn=bksandq=Bary+b+brey>
8. [http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher\\_Slides/mod1/M1L3.pdf](http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/M1L3.pdf)

## Cloud Computing Foundations (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI442	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to:

- Explain the phases of transition from classic data center to virtual data center and then to the Cloud.
- Explain the key characteristics, services, and deployment models of Cloud.
- Describe the Cloud infrastructure components and service management processes.
- Describe the Cloud security concerns and solutions.
- List the key considerations for migration to the Cloud.

### Syllabus

#### Module - I

**Journey to the Cloud** : Drivers for cloud computing, cloud definition and characteristics, building cloud infrastructure – a phased approach from Classic data center to virtual data center to Cloud, virtualization and its benefits, advantages and disadvantages of cloud computing. **08 Hours**

#### Module - II

**Cloud Computing Primer** : Cloud deployment models private, public, hybrid and community cloud, cloud services – SaaS, PaaS, and IaaS, cloud economics and challenges, advantages and disadvantages of cloud computing. **08 Hours**

#### Module - III

**Cloud infrastructure and Management** : Cloud infrastructure framework and components, infrastructure management and service creation tools, cloud service management processes asset and configuration management, service catalog management, financial management, capacity, performance and availability Management. **08 Hours**

#### Module - IV

**Cloud Security** : Basic information security concepts, cloud security concerns and threats, security mechanisms in cloud at compute, storage, and network layer, Governance, Risk and compliance in Cloud. **08 Hours**

## Module - V

**Cloud Migration Considerations :** Considerations for choosing right application and cloud model, service provider specific considerations, cloud adoption phases, Financial and technical feasibility assessment, migration and optimization considerations.

**08 Hours**

### Course Outcomes:

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

- Explain the phases of transition from classic data center to virtual data center and then to the Cloud.
- Explain the key characteristics, services, and deployment models of Cloud.
- Describe the Cloud infrastructure components and service management processes.
- Describe the Cloud security concerns and solutions.
- List the key considerations for migration to the Cloud.

### Reference Books:

1. Thomas Erl: "Cloud Computing", Pearson Education, 1st Edition, 2014, ISBN-13: 978-9332535923.
2. Judith Hurwitz, Marcia Kaufman, Fern Halper: "Cloud Computing for dummies", Wiley, 1st Edition, 2009, ISBN-13: 978-0470484708.
3. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, John Wiley and Sons Publications, 2011.

### E-Resources:

1. <http://www.buyya.com/MasteringClouds/ToC-Preface-TMH.pdf>



## Object Oriented Programming using JAVA

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSI443	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 object-oriented programming and difference between Procedure–Oriented Programming and Object Oriented Programming.
- Get a clear understanding of basics of javaProgramming.
- Analyze the concepts of Inheritance, Exception and Packages in java.
- Learn how GUI can be designed and developed in Java using Applets and Swings.
- Study how to handle events and 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, Console I/O, variables and reference variables, Function Prototyping, Function Overloading, Introduction to Classes and Objects, member functions and member data, objects and functions, objects and arrays, Namespaces, Nested classes, Constructors, Destructors. **08 Hours**

#### Module – II

**Introduction to Java** : Java’s magic, The Byte code, Java Development Kit (JDK), Java Buzzwords, Object-oriented programming, Simple Java programs, Data types, variables and arrays, Operators, Control Statements. **08 Hours**

#### Module – III

**Classes, Inheritance, Exceptions, Packages and Interfaces** : Classes: Classes fundamentals, Declaring objects, Constructors, this keyword, garbage collection. Inheritance: inheritance basics, using super, creating multi level hierarchy, method overriding. Exception handling: Exception handling in Java, Packages, Access Protection, Importing Packages, Interfaces. **08 Hours**

#### Module – IV

**The Applet and Swings** : Introduction, types of Applets, Applet basics, Applet Architecture, An Applet skeleton, Simple Applet display methods, Requesting

repainting, Using the Status Window, The HTML APPLET tag, Passing parameters to Applets, getDocumentbase() and getCodebase(). Swings: The origins of Swing, Two key Swing features, Components and Containers, The Swing Packages, A simple Swing Application, Create a Swing Applet, JLabel and ImageIcon, JTextField, The Swing Buttons, JTabbedPane, JScrollPane, JList, JComboBox, JTable. **08 Hours**

## Module – V

**Event Handling and Multi-Threaded Programming** : Two event handling mechanisms, The delegation event model, Event classes, Sources of events, Event listener interfaces, Using the delegation event model, Adapter classes, Inner classes. Multi-Threaded Programming: What are threads? How to make the classes threadable, Extending threads, Implementing runnable, Synchronization, Changing state of the thread, Bounded buffer problems, read-write problem. **08 Hours**

### Laboratory

Programs covering Classes and Objects, Inheritance, Exception Handling, Packages, Applets, Swings, Multithreading and Event Handling.

### Course Outcomes:

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

- Understand the basic concepts of Procedure–Oriented Programming and object-oriented programming.
- Achieve the Knowledge of developing simple java programs.
- Develop computer programs to solve real world problems.
- Design simple GUI interfaces to interact with users, using Applets and swings.
- Achieve Knowledge of multi-threading and to comprehend the event-handling techniques.

### Text Books:

1. SouravSahay, Object Oriented Programming with C++, Oxford University Press, 2006 (Chapters 1, 2, 4)
2. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 1-6, 8-11, 21, 22, 29, 30)

### Reference Books:

1. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.
2. Mahesh Bhavne and Sunil Patekar, “Programming with Java”, First Edition, Pearson Education, 2008, ISBN:9788131720806
3. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.

## Renewable Energy Resources

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET451	4:0:0:0	4	CIE:50 SEE:50	3 Hours	EE

### Course Objectives:

This course will enable students to :

- Provide detailed information of the present energy scenario and the available Renewable Energy Resources.
- Get detailed insight knowledge in basics of solar radiation geometry and various measurement techniques.
- Understand the solar energy through solar thermal devices, PV conversion and their performance analysis.
- Gain the conceptual knowledge about the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- Give introduction to energy from Biomass, Hydrogen energy and their impact on environment and sustain ability.

### Syllabus

#### Module – I

**Introduction:** Energy source, India's production and reserves of commercial energy sources, need for non-conventional energy sources.

**Solar Radiation:** Extra-Terrestrial radiation, spectral distribution of extraterrestrial radiation, solar constant, solar radiation at the earth's surface, beam, diffuse and global radiation, solar radiation data.

**Measurement of Solar Radiation:** Pyrometer, shading ring pyrheliometer, sunshine recorder, schematic diagrams and principle of working. **10 Hours**

#### Module – II

**Solar Radiation Geometry :** Flux on a plane surface, latitude, declination angle, surface azimuth angle, hour angle, zenith angle, solar altitude angle expression for the angle between the incident beam and the normal to a plane surface (No derivation), and local apparent time. Apparent motion of sun, day length, numerical examples.

**Radiation Flux on a Tilted Surface:** Beam, diffuse and reflected radiation, expression For flux on a tilted surface (no derivations), numerical examples.

**Solar Thermal Conversion:** Collection and storage, thermal collection devices, liquid flat plate collectors, solar air heaters concentrating collectors (cylindrical, parabolic, paraboloid) (Quantitative analysis). **10 Hours**

### Module – III

**Performance Analysis of Liquid Flat Plate Collectors :** General description, collector geometry, selective surface (qualitative discussion) basic energy-balance equation, stagnation temperature, transmissivity of the cover system, transmissivity-absorptivity product, numerical examples. The overall loss coefficient, correlation for the top loss coefficient, bottom and side loss coefficient, problems (all correlations to be provided). Temperature distribution between the collector tubes, collector heat removal factor, collector efficiency factor and collector flow factor, mean plate temperature, instantaneous efficiency (all expressions to be provided). Effect of various parameters on the collector performance; collector orientation, selective surface, fluid inlet temperature, number covers, dust. **12 Hours**

### Module – IV

**Photovoltaic Conversion :** Description, principle of working and characteristics, applications.

**Wind Energy:** Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Wind machines: Types of wind machines and their characteristics, horizontal and vertical axis wind mills.

**Tidal Power:** Tides and waves as energy suppliers and their mechanics, fundamental characteristics of tidal power, harnessing tidal energy, limitations.

**Ocean Thermal Energy Conversion:** Principle of working, Rankin cycle.

**Geothermal Energy Conversion:** Principle of working, Types of geothermal station With schematic diagram. **10 Hours**

### Module – V

**Energy from Bio Mass:** Photosynthesis, photosynthetic oxygen production, energy plantation, bio gas production from organic wastes by anaerobic fermentation, description of bio-gas plants, transportation of bio-gas, problems involved with bio-gas production, application of bio-gas, application of bio-gas in engines, advantages.

**Hydrogen Energy :** Properties of Hydrogen with respected to its utilization as a renewable form of energy, sources of hydrogen, production of hydrogen, electrolysis

of water, thermal decomposition of water, thermo chemical production bio-chemical production.

**10 Hours**

### **Course Outcomes:**

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

- Explain the present energy scenario and the available Renewable Energy Resources.
- Describe the basics of solar radiation geometry and various measurement techniques.
- Analyze the knowledge gained in tapping the solar energy through solar thermal devices, pv conversion and their performance analysis.
- Demonstrate the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- Apply knowledge of Biomass and Hydrogen energy and their impact on environment and sustainability.

### **Text Books:**

1. G D Rai: "Non-Conventional Energy Sources", (Chapters 1-3,6-9,11), 5<sup>th</sup> Edition, Khanna Publishers, 2011, ISBN-13: 9788174090737.
2. John Twidell and Tony Weir: "Renewable Energy Resources", (Chapters 2,5-7,9-14), 3<sup>rd</sup> Edition, Routledge Publisher, 2015, ISBN-13: 978041558437.
3. N K Bansal: "Non-Conventional Energy Resources", (Chapters 1-3,9,10,12,13), 1<sup>st</sup> Edition, Vikas Publishing, 2014, ISBN-13: 978935978577.

### **Reference Books:**

1. B H Khan: "Non-Conventional Energy Resources", (Chapters 4-10), 2<sup>nd</sup> Edition, Tata McGraw-Hill Pub., 2006, ISBN-13: 9780070142763.
2. S P Sukhatme, J K Nayak, "Solar Energy", (Chapters 3,4), 3<sup>rd</sup> Edition, Tata McGraw-Hill Pub., 2008, ISBN-13: 9780070260641.



## Introduction to Cyber Security and Cyber Laws

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET452	4:0:0:0	4	CIE:50 SEE:50	3 Hours	EE

### Course Objectives:

This course will enable students to :

- Understand the area of cyber security.
- Know and understand the technological aspects of Information Security.
- Understand various cyber threats.
- Understand and recognize the cyber forensics.
- Know Legal Perspectives in cyber security.

### Syllabus

#### Module - I

**Introduction to Cyber crime and Information Security** : Cyber crime: Definition and Origins of the Word, Who are Cyber criminals? Classifications of Cyber crimes, Introduction to information security, Need for Information security, Threats to Information Systems. Cyber Offenses: How Criminals Plan Them: How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cyber crimes, Botnets: The Fuel for Cyber crime, Attack Vector, Cloud Computing. **11 Hours**

#### Module – II

**Tools and Methods Used in Cyber crime** : Introduction, Proxy Servers , Key loggers and Spy wares, Back doors, Steganography, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft). Security Technology - Firewall and VPNs, Intrusion Detection, Access Control. **10 Hours**

#### Module – III

**Cyber Threats** : -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack,DDOS, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards. Digital Signature, Public Key Cryptography. **10 Hours**

#### Module – IV

**Understanding Computer Forensics** : Digital Forensics Science, The Need for Computer Forensics, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting

up a Computer Forensics Laboratory: Understanding the Requirements, Relevance of the OSI 7 Layer Model to Computer Forensics, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Antiforensics. **11 Hours**

### Module – V

**Security Policies :** Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License.

**10 Hours**

#### Course Outcomes :

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

- Understand the basics of cyber security.
- Explain the functionalities of cyber/information security.
- Be aware of various cyber threats.
- Understanding cyber forensics.
- Describe IT Act, Suggest appropriate security countermeasures for the given scenario.

#### Text Books :

1. Sunit Belapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81-265-21791, Publish Date 2013
2. V.K. Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.

#### Reference Books :

1. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla ,”Introduction to Information Security and Cyber Law” Willey Dreamtech Press.
2. Thomas J. Mowbray, “Cybersecurity: Managing Systems, Conducting Testing, and Investigating Intrusions”, Copyright © 2014 by John Wiley & Sons, Inc, ISBN: 978 -1-118 - 84965 -1.

#### E-Resources :

1. <https://slideplayer.com/slide/12803493/>



## Management Information System

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET453	4:0:0:0	4	CIE:50 SEE:50	3 Hours	EE

### Course Objectives:

This course will enable students to :

- Effectively use and administrate information systems in different business applications.
- Understand problem solving techniques to model information system solutions for business problems.
- Understand the usage of intranet and extranets in management information systems.
- Analyze the principles of Transaction Processing Systems.
- Understand the business and professional responsibilities related to the use of information system in Organizations.

### Syllabus

#### Module – I

**Foundations of information systems in business:** Introduction to Information Systems in Business: Why study Information Systems?, What you need to know, A global Information society, Success and Failure with IT, Why Businesses need Information Technology. Fundamentals of Information Systems: Fundamental Information System concepts: System concepts, Components of an Information System, Information System Resources, Information System activities, Overview of Information Systems: The expanding Role of Information Systems, Operations support Systems, Management support Systems, Other classifications of Information Systems. **10 Hours**

#### Module – II

**Solving Business Problems with Information Systems:** A Systems Approach to problem Solving: The Systems approach, Defining problems and opportunities, Developing alternative solutions, Evaluating Alternative solutions, Selecting the best solution, Using the Systems approach. Developing Information System Solutions: The system development cycle, Starting the Systems Development process, Systems Analysis, Systems Design, Prototyping, Implementing a new Information System, Maintenance of Information System, Computer Aided Systems Engineering, End user development. Business applications –I The Internet, Electronic Commerce and Business: Introduction, Business use of the Internet, Interactive marketing, Business

value of the Internet, Customer value and the Internet. Fundamentals of Electronic Commerce: Introduction, Foundations and applications of e-commerce, Business to Consumer and Business to Business commerce, Electronic payments and security.

**10 Hours**

### **Module – III**

**Intranets, Extranets, and Enterprise Collaboration:** Intranets and Extranets in Business: Business Value, Applications and Technologies for Intranets, Role of Extranets, Enterprise Collaboration Systems: Enterprise Collaboration, Group Ware, Electronic communication and Conferencing tools, collaborative work management tools. Information Systems for Business Operations: Business Information Systems: Cross Functional Marketing, Manufacturing, Human Resources, Accounting and Financial Information Systems.

**10 Hours**

### **Module – IV**

**Transaction Processing Systems:** Transaction Processing, Data entry, Batch and Real-time processing, Database maintenance, Document and Report generation, Inquiry processing.

#### **Business applications -II**

**Information Systems for Strategic Advantage:** Introduction, Competitive strategy, Strategic Roles for Information System, Breaking Business Barriers, Value chain and strategic Information System, Strategic Applications and Issues in information Technology, Re-engineering Business process, Improving Business quality, Becoming an agile competitor. Creating a virtual Company, Building the knowledge-creating company, Using the Internet Strategically.

**11 Hours**

### **Module – V**

**Managing information technology:** Enterprise and global Management: Managing Information Resources and Technologies: Information Technology Architecture, Managers and Information Technology, Organizations and Information Technology, Information Resource Management, Strategic Management Operational Management, Resource Management, Technology Management, Global Information Technology Management: The International Dimension, Global IT Management, Cultural, Political and Geo-Economic challenges, The global company, Global Business and IT strategies, Global Business and IT applications, Global IT Platforms, Global data Issue, Global Systems development, You and Global IT Management, Planning. Implementing change: Planning for Business change with IT: Organizational planning, Information System planning Methodologies, The scenario approach, planning for

competitive advantage, Critical success factors, Business Systems Planning, Computer Aided Planning tools, implementing business change.

**11 Hours**

### **Course Outcomes:**

On completion of this course, students will able to:

- Describe the roles and functionalities of information system.
- Analyze types of solutions for business and its applications.
- Analyze the usage of Intranet and Extranet in business applications.
- Describe database management and competitive strategic approach of information systems in business applications.
- Describe various approaches in managing information technology.

### **Text Books:**

1. James O'brien, George Marakas: "Management Information System", 10th Edition, McGraw Hill Education, 2010, ISBN-13: 978-0-07-337681-3, ISBN: 0-07337681-7.
2. M V Gandhi, B S Thomson: "Smart Materials and Structures", (Chapters 13-75), 1st Edition, Chapman and Hall Pub., 1992, ISBN-13: 9780412370106.

### **Reference Books:**

1. Kenneth C. Laudon and Jane P. Laudon: "Management Information System, Managing the Digital Firm", 11th Edition, Pearson Education, 2006.
2. Steven Alter: "Information Systems-The Foundation of E-Business", 4th Edition, Pearson Education, 2002.

### **E-Resources:**

1. [https://books.google.co.in/books/about/Management\\_Information\\_System.html](https://books.google.co.in/books/about/Management_Information_System.html).
2. <http://www.pearsoned.co.uk/bookshop>



## Environmental Air Pollution

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET454	4:0:0:0	4	CIE:50 SEE:50	3 Hours	EE

### Course Objectives:

- The fundamentals of air pollution with a background on historical perspective on air pollution and current air quality policies and standards.
- Major air pollutants, their sources and their effects (environmental, economic and health) and how emissions are estimated from road traffic and industrial sources.
- Dispersion of air pollutants in the atmosphere.
- Analyze and present outputs of air quality models to a wide range of audiences.
- Different air quality monitoring equipments.

### Syllabus

#### Module - I

Introduction: Definition – Classification and Characterization of Air Pollutants, Emission Sources, Behaviour and Fate of air pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced Smog.

Effects of Air Pollution: On Human Health, Animals, Plants and Materials – Major Environmental Air Pollution Episodes–London Smog, Los Angeles Smog and Bhopal Gas Tragedy.

**08 Hours**

#### Module - II

Meteorology: Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Windrose, General Characteristics of Stack Plumes, Meteorological Models. Factors to be considered in Industrial Plant Location and Planning, Noise pollution sources, measurement units, effects and control.

**10 Hours**

#### Module - III

Sampling, Analysis and Control: Sampling and Measurement of Gaseous and Particulate matter, Stack Sampling, Analysis of Air Pollutants, Smoke and Smoke Measurement.

Air Pollution Control Methods: Particulate, Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of a Particulate Collecting Equipment.

**10 Hours**

**Module - IV**

Control of Gaseous Emissions, Adsorption by Liquids, Adsorption by Solids, Combustion Odors and their control.

Air Pollution due to Automobiles: Air Pollution due to Gasoline Driven and Diesel Driven Engines, Effects, Direct and Indirect Methods of control. **10 Hours**

**Module - V**

Burning Environmental Issues: Acid Rain, Global Warming, Ozone Depletion in Stratosphere, Indoor Air Pollution.

Environmental Legislation: Environmental Policy, Environmental Acts, Water, Air and Noise Pollution Standards. **10 Hours**

**Course Outcomes:**

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

- Examine emission standards for industrial and other sources.
- Identify air pollution concentrations as a function of emission, meteorology, topography and the built environment.
- Discuss impact of air pollution on health of humans, animals, plants and materials.
- Identify different equipments for air quality monitoring and control.
- Distinguish between global and local effects of air pollution as well to recognize the legal aspects associated with air pollution.

**Text Books:**

1. Rao M.N. and Rao H.V.N: "Air Pollution", (Chapters 1-6), Tata- McGraw- Hill Publishing Company Ltd., New Delhi, India, 2011, ISBN 13: 978-0074518717.
2. Anjaneyulu Y: "Air Pollution and control Technologies", (Chapters 2-5), Allied Publishers, Delhi, 2012, ISBN- 13: 9788177641844.
3. Rao C.S: "Environmental Pollution Control Engineering", (Chapters 2-6), New age International Publishers, New Delhi, 2<sup>nd</sup> Edition, 2013, ISBN- 13: 978-8122418354.

**References Books:**

1. Gilbert M Masters: "Introduction To Environmental Engineering and Science", (Chapters 1-4), Pearson Education, 3<sup>rd</sup> Edition, 2007, ISBN-13: 978-0131481930.
2. Mahajan S.P: "Pollution Control in Process Industries", (Chapters 1-5), Tata McGraw Hill Publishing Co., New Delhi, 2010, ISBN-13: 978-0074517727.

**E-Resources:**

1. <http://nptel.ac.in/courses/105102089/>
2. <http://nptel.ac.in/courses/105104099/>
3. [nptel.ac.in/courses/103107084/module1/lecture1/lecture1.pdf](http://nptel.ac.in/courses/103107084/module1/lecture1/lecture1.pdf)

## Design and Analysis of Algorithms Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSL46	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Understand problems by applying appropriate algorithms.
- Analyze the efficiency of various algorithms.
- Apply techniques of stacks and queues to solve problems.
- Solve a program in many ways using different techniques.
- Identify and evaluate complex problems using principles of mathematics and engineering science.

Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX environment.

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 are able to:

- Solve problems by applying appropriate algorithms.
- Analyze the efficiency of various algorithms.
- Apply techniques of stacks and queues to solve problems.
- Develop a program that can be solved in many ways using different techniques.
- Identify and evaluate complex problems using principles of mathematics and engineering science.

**Text Books:**

1. Anany Levitin: "Introduction to the Design and Analysis of Algorithms", Pearson Education, Delhi, 2nd Edition, 2007, ISBN: 9780321358288.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: "Fundamentals of Computer Algorithms", 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://cs.gmu.edu/~pwiegand/cs483-Spring06/lecturenotes/cs483-11pf.pdf>
2. <http://www.cs.cornell.edu/~kozen/papers/daa.pdf>



## Technical Report Writing And IRDP

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CSD47	1:0:2:0	1	CIE:50 SEE:50	3 Hours	S&H

### Course Objectives:

- Implement English vocabulary at command and ensure language proficiency
- Achieve better Technical writing and Presentation skills Identify the common errors in speaking and writing English
- Acquire Employment and Workplace communication skills
- Augment LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred.

### Syllabus

#### Module - I

Introduction, Leaving taking, Request for Repetition, Asking for Information, Complaining, Asking about Preferences, Agreeing and Disagreeing, Starting a conversation with a stranger, Making Requests, Expressing Gratitude, Complimenting and Congratulating, Apologizing and Responding an Apology, Expressing Sympathy, Seeking Permission, Offering to Help, Ending a Conversation. **05 Hours**

#### Module – II

Oral Presentation, IT Extempore/Public speaking. **05 Hours**

#### Module – III

Story telling, debating. **06 Hours**

#### Module – IV

Mock interview, Telephonic Interview, Group Discussion, Personal Interview, Employment Interview, Dialogues in Various Situations. **05 Hours**

#### Module – V

Non-Verbal Communication skills (Body Language), Communication at Workplace Interpersonal Communication skills. **05 Hours**

### Course Outcomes:

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

- Identify common errors in spoken and written communication.
- Get familiarized with English vocabulary and language proficiency.
- Improve nature and style of sensible writing and acquire employment and workplace communication skills.
- Improve their Technical Communication Skills through Technical Reading and Writing practices.
- Perform well in campus recruitment, engineering and all other general competitive examinations.

### Text Book:

1. S.L.N. Sharma, K.shankaranarayana: “Basic Grammar”, Navakarnataka Vinyasa Pvt. Limited.

### Reference Books:

1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2018. Refer it’s workbook for activities and exercises — “Communication Skills — I (A Workbook)” published by Oxford University Press—2018.
2. English Language Communication Skills (Lab Manual cum Workbook), Cengage learning India Pvt Limited [Latest Revised Edition]—2018, Reference Books.
3. English for Technical Communication by N.P. Sudharshana and C. Savitha, Cambridge University Press— 2016.



## Vyavaharika Kannada

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18KAK48 / 18KVK48	1:0:0:0	1	CIE:50 SEE:50	1 Hours	S&H

### Course Objectives:

- The course will enable the students to understand Kannada and communicate in Kannada language.

### Syllabus

#### Module - 1

Vyavaharika kannada – Parichaya (Introduction to Vyavaharika Kannada).

#### Module - 2

Kannada Aksharamale haagu uchcharane ( Kannada Alfabets and Pronunciation).

#### Module - 3

Sambhashanegaagi Kannada Padagalu (Kannada Vocabulary for Communication).

#### Module - 4

Kannada Grammar in Conversations (Sambhashaneyalli Kannada Vyakarana).

#### Module - 5

Activities in Kannada.

### Course Outcomes:

- At the end of the course, the student will be able to understand Kannada and communicate in Kannada language.



## Aadalitha Kannada

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18KAK48 / 18KVK48	1:0:0:0	1	CIE:50 SEE:50	1 Hours	S&H

### ಆಡಳಿತ ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು

- ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಆಡಳಿತ ಕನ್ನಡದ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ಅವುಗಳ ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅಸಕ್ತಿ ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

### ಪರಿವಿಡಿ (ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಾಯ - 1

ಕನ್ನಡಭಾಷೆ - ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ.

ಅಧ್ಯಾಯ - 2

ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ.

ಅಧ್ಯಾಯ - 3

ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ.

ಅಧ್ಯಾಯ - 4

ಪತ್ರ ವ್ಯವಹಾರ.

ಅಧ್ಯಾಯ - 5

ಆಡಳಿತ ಪತ್ರಗಳು.

ಅಧ್ಯಾಯ - 6

ಸರ್ಕಾರದ ಆ0ದೇಶ ಪತ್ರಗಳು.

ಅಧ್ಯಾಯ - 7

ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಸೈಸ್ ರೈಟಿಂಗ್), ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ.

**ಅಧ್ಯಾಯ - 8**

ಕನ್ನಡ ಶಬ್ದಸಂಗ್ರಹ.

**ಅಧ್ಯಾಯ - 9**

ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ.

**ಅಧ್ಯಾಯ - 10**

ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ / ಕಂಪ್ಯೂಟರ್ ಪಾರಿಭಾಷಿಕ ಪದಗಳು.

**ಆಡಳಿತ ಕನ್ನಡ ಕಲಿಕೆಯ ಫಲಿತಾಂಶಗಳು**

- ಆಡಳಿತ ಭಾಷೆ ಕನ್ನಡದ ಪರಿಚಯವಾಗುತ್ತದೆ.
- ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡುತ್ತದೆ.
- ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳು ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳು ಪರಿಚಯಿಸಲ್ಪಡುತ್ತವೆ.
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡುತ್ತದೆ.
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅಸಕ್ತಿ ಮೂಡುತ್ತದೆ.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳು ಪರಿಚಯಿಸಲ್ಪಡುತ್ತವೆ.

**ಪರೀಕ್ಷೆಯ ವಿಧಾನ :**

1. ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ - CIE (Continuous Internal Evaluation):
2. ಕಾಲೇಜು ಮಟ್ಟದಲ್ಲಿಯೇ ಆಂತರಿಕ ಪರೀಕ್ಷೆಯನ್ನು 100 ಅಂಕಗಳಿಗೆ ವಿಶ್ವವಿದ್ಯಾಲಯದ ನಿಯಮಗಳು ಮತ್ತು ನಿರ್ದೇಶನದಂತೆ ನಡೆಸತಕ್ಕದ್ದು.

**ಪಠ್ಯಪುಸ್ತಕ :**

1. ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ (Kannada for Administration), ಸಂಪಾದಕರು : ಡಾ.ಎಲ್. ತಿಮ್ಮೇಶ, ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ,

**ಪ್ರಕಟಣೆ :**

1. ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.



**NAGARJUNA**

**COLLEGE OF ENGINEERING & TECHNOLOGY**

*An Autonomous College under VTU*

**DEPARTMENT OF COMPUTER SCIENCE  
& ENGINEERING**

**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 centre of excellence by creating knowledge through research and industrial exposure in the area of Computer Science & Engineering.
- M3:** Developing communication skill, leadership qualities, team work & 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.

**V to VIII Semesters**

***Scheme and Syllabus***

***With effect from Academic Year 2019-20***

**Fifth Semester B.E. – Scheme**

Sl. No.	Course Code	Course Name	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17CST51	Computer Networks	CS	3-0-0-0	3	100
2	17CSI52	Microcontrollers (IC)	CS/EC	3-0-2-0	4	100
3	17CST53	Operating Systems	CS	3-0-0-0	3	100
4	17CST54	Software Engineering and Testing	CS	3-0-0-0	3	100
5	17CSI55X	Foundation Elective-IV (IC)	CS	3-0-2-0	4	100
6	17CST56X	Engineering Elective-V /PBL	CS	3-0-0-0	3	100
7	17CSL57	Computer Networks Laboratory	CS	1-0-2-0	2	100
8	17CSL58	Operating Systems Laboratory	CS	1-0-2-0	2	100
9	17CSH59	General Aptitude	CS/BS&H	2-0-0-0	2	100
		<b>Total</b>		<b>22-0-8-0</b>	<b>26</b>	<b>900</b>

**Foundation Elective-IV (IC)**

Sl. No.	Course Code	Course Name
1	17CSI551	Advanced Algorithms
2	17CSI552	Object Oriented Programming with JAVA
3	17CSI553	Computer Graphics

**Engineering Elective-V / PBL**

Sl. No.	Course Code	Course Name
1	17CST561	Operations Research
2	17CST562	Computer Forensics (MOOCS)
3	17CST563	The Data Scientist's Toolbox (Certificate Course) Johns Hopkins University

CSE Scheme and Syllabus 2019 -2020

**Outcome Based Education(OBE)/  
Choice Based Credit System (CBCS) Curricula  
Sixth Semester B.E. – Scheme**

Sl. No.	Course Code	Course Name	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17CST61	Unix System Programming	CS	3-0-0-0	3	100
2	17CST62	System Software	CS	3-0-0-0	3	100
3	17CSI63	Embedded Systems (IC)	CS	3-0-2-0	4	100
4	17CSI64X	Foundation Elective-VI (IC)	CS	3-0-2-0	4	100
5	17CST65X	Engineering Elective-VII /PBL	CS	3-0-0-0	3	100
6	17HOE66X	Open Elective-VIII	CS/BS&H	2-0-0-4	3	100
7	17CSL67	Unix System Programming Laboratory	CS	1-0-2-0	2	100
8	17CSH68	Technical Aptitude and GD	CS/BS&H	2-0-0-0	2	100
9	17CSP69	Mini Project and Seminar	CS	1-0-2-0	2	100
		<b>Total</b>		<b>21-0-8-4</b>	<b>26</b>	<b>900</b>

### Foundation Elective-VI (IC)

Sl. No.	Course Code	Course Name
1	17CSI641	Data Mining
2	17CSI642	Database Concepts
3	17CSI643	Soft Computing

### Engineering Elective-VII / PBL

Sl. No.	Course Code	Course Name
1	17CST651	Artificial Intelligence
2	17CST652	Network Security (MOOCS)
3	17CST653	Operations Analytics (Certificate Course) Wharton University of Business

### Open Elective-VIII

Sl. No.	Course Code	Course
1	17HOE661	Lab View – Level 1
2	17HOE662	Yoga and Meditation
3	17HOE663	Martial Arts
4	17HOE664	Music (Carnatic Vocal / Instrumental)
5	17HOE665	Dance
6	17HOE666	Sports
7	17HOE667	Online Certification Courses from IITs / IISc / SWAYAM / EDX

**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
	<b>Total</b>			<b>17-0-14-8</b>	<b>26</b>	<b>900</b>

**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

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)

**Eighth Semester B.E. – Scheme**

Sl. No.	Course Code	Course Name	Teaching Dept.	Total Credits	Marks
1	17CSP81	Project Phase-II	CS	4	100
2	17CSP82	Project Phase-III	CS	4	100
3	17CSP83	Evaluation and Viva-voce (External)	CS	10	100
	<b>Total</b>			<b>18</b>	<b>300</b>

IC – Integrated Course

L – Lecture

T-Tutorials

P-Practical

S – Self Study

# Fifth Semester B.E. – Syllabus

## Computer Networks

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST51	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Become familiar with the basics of data communications.
- Understand OSI and TCP/IP models.
- Understand the concepts of data link layer and network layer.
- Become familiar with the basics of packet switching.
- Understand the concepts of network security and network management and its applications.

### Syllabus

#### Module – I

**Introduction, Network model, Physical Layer & media:** Data Communications, Networks, Protocols & Standards, Layered Tasks, The OSI model, Layers in OSI model, TCP/IP Protocol suite, Addressing, Transmission Impairment, Data Rate limits, Performance, Digital-digital conversion (Only Line coding: Polar, Bipolar and Manchester coding) **08 Hours**

#### Module – II

**Switching & Data Link Layer:** Introduction to switching, Datagram Networks, Virtual Circuit Networks, Error Detection & Correction: Introduction, Block coding, Cyclic codes, Checksum. **08 Hours**

#### Module – III

**Data Link control, Network Layer:** Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy channels, HDLC, PPP (Framing, Transition phases only) Random access, Controlled Access, Channelization, Ethernet: IEEE standards. IPv4, IPv6. **08 Hours**

#### Module – IV

**Packet Switching Networks, Network Security:** Routing in Packet networks, Shortest path routing: Bellman-Ford algorithm, Overview of network security, secret key encryption protocol, public key encryption protocols. **08 Hours**

## Module – V

Applications and Network Management, Mobile AdHoc Networks: Application layer overview, Domain Name System (DNS), Remote Login Protocols, E-mail, FTP, World Wide Web and HTTP, Network management. Overview of Wireless Ad-Hoc networks, Routing in AdHoc Networks, Routing protocols for AdHoc networks. **08 Hours**

### Course Outcomes

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

- Design and solve problems on shortest path routing algorithms.
- Analyze framing concepts, flow and error control algorithms.
- Explain concepts of cryptography algorithms.
- Design and apply application layer protocols.
- Analyze different networks.

### Text Books:

1. Behrouz A. Forouzan: “Data Communication and Networking”, 5<sup>th</sup> Edition, Tata McGraw-Hill, 2012, ISBN: 978-0-07-337622-6, (Chapters 1-4,8,10-13).
2. Alberto Leon-Garcia and Indra Widjaja: “Communication Networks -Fundamental Concepts and Key architectures,” 2<sup>nd</sup> Edition, Tata McGraw-Hill, 2004, reprint 2007, ISBN-13: 978-0-07-059501-9, (Chapter 7).
3. Nader F. Mir: “Computer and Communication Networks”, 2<sup>nd</sup> Edition, Pearson Education, 2015, ISBN: 0133814742, (Chapters 9,10,19).

### Reference Books:

1. William Stallings: “Data and Computer Communication”, 8<sup>th</sup> Edition, Pearson Education, 2007, ISBN-13: 978-0133506488.
2. Larry L. Peterson and Bruce S. Davie: “Computer Networks – A Systems Approach”, 4<sup>th</sup> 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>



## Microcontrollers (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI52	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Gain knowledge about, microprocessors, microcontrollers and RISC & CISC CPU architectures.
- Learn the 8051 architecture and its assembly language programming.
- Familiarize with Embedded 'C' programming and counters & timers programming in 8051.
- Understand 8051 connections to RS-232 and Interrupts programming.
- Acquire knowledge about, interfacing of 8051 with LCD, Keyboard, DAC, ADC, Stepper motor.

### Syllabus

#### Module – I

**Introduction to Microcontrollers:** Microprocessors and Microcontroller, Introduction, Difference between Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, Embedded Electronic Systems and Microcontrollers, Comparison of different microcontrollers and applications.

**The 8051 Architecture:** Introduction, 8051 Microcontroller Hardware, Input / Output Pins, Ports and Circuits, External Memory. **08 Hours**

#### Module – II

**Assembly Language Programming in 8051:** Addressing Modes and Instruction set: Introduction, Addressing modes, Data transfer instructions, Example Problems, Arithmetic instructions, Logical instructions, Example Problems, JUMP and CALL Program range, Jumps, calls and Subroutines, Returns, Example Problems. **08 Hours**

#### Module – III

**Embedded 'C' Programming:** 8051 programming in C: Data types and time delays in 8051 C, I/O programming, logic operations, data conversion programs, accessing code ROM space, data serialization. Timer / Counter Programming in 8051: Counters and timers programming 8051 Timers, Counter Programming, programming timers 0 and 1 in 8051 C. **08 Hours**

### Module – IV

**8051 Serial Communication:** Basics of Serial Communication- Serial data input/output, 8051 connections to RS-232, 8051 Serial Communication Programming Interrupts Programming: 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Interrupt programming in C **08 Hours**

### Module – V

**8051 Interfacing and Applications:** Interfacing 8051 to LCD, Keyboard, DAC, ADC Stepper motor interfacing. **08 Hours**

### Laboratory:

#### Programming for the 8051 Microcontroller:

- 1 a. To perform the multiplication of two 16-bit numbers.  
b. To implement (display) an eight bit UP/DOWN decimal counter on watch window.
- 2 a. To sort block of data in ascending or descending order.  
b. To interface a DAC & Generate a square wave with specified amplitude and frequency using DAC. Display the waveform on the CRO.
- 3 a. To count number of ones and zeros in an eight bit number.  
b. To interface an ADC and temperature Sensor to measure temperature.
- 4 a. To convert an 8-bit BCD number into ASCII.  
b. To Interface a stepper motor – and rotate it clock wise or anti clock wise through a given number of steps.
- 5 a. To check whether given number is palindrome or not. If palindrome store FFh in accumulator else store 00h in accumulator.  
b. To generate 1second delay continuously using on chip timer.

### Course Outcomes:

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

- Explain the basic concepts of microprocessors, RISC & CISC CPU and architecture of 8051 microcontroller.
- Write assembly language programming in 8051.
- Develop assembly and embedded C Programming for 8051 microcontroller
- Discuss 8051 connections to RS-232 and Interrupts programming.

- Design and develop applications related to interfacing of 8051 to LCD, Keyboard, DAC, ADC, Stepper motor.

**Text Books:**

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Janice Gillispie Mazidi: “The 8051 Microcontroller: A Systems Approach”, Pearson Education, Limited, 2013, ISBN: 1292027266, 9781292027265, (Chapters 1-3,5,7,8).
2. Kenneth J. Ayala: “The 8051 Microcontroller Architecture, Programming & Applications”, 2<sup>nd</sup> Edition, Thomson Learning, 2005, ISBN: 0314772782, 9780314772787, (Chapters 1,4,5).

**Reference Books:**

1. Predko: “Programming and Customizing the 8051 Microcontroller”, TMH, ISBN-10: 8131706974.
2. Raj Kamal: “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005, ISBN-13: 978-8131706978.

**E-Resources:**

1. <https://yvuqarox.files.wordpress.com/2015/06/myke-predko-8051-pdf.pdf>
2. <https://books.google.co.in/books?id=pWlBvW0H3IAC&pg=PA663&lpg=PA663&dq=1.%09Rajkamal,+%E2%80%9CMicrocontrollers:+Architecture>,



## Operating Systems

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST53	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to

- Learn various concepts of operating system
- Learn the concepts of Process synchronization
- Gain knowledge about deadlock's occurring in resource allocation.
- Understand the memory management function of operating system
- Realize the role of operating system in file management.

### 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; Operating System structure; Virtual machines; Operating System generation; System boot. **08 Hours**

#### Module – II

**Process Management:** Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling **08 Hours**

#### Module – III

**Process Synchronization: Synchronization:** The critical section problem, semaphores, classical problems of synchronization.

**Deadlocks:** Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. **09 Hours**

#### Module – IV

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

Virtual Memory Management: Background; Demand paging; Page replacement; Allocation of frames. **08 Hours**

### Module – V

**File System, Implementation of File System:** File System: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. **07 Hours**

### Course Outcomes

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

- Explain the concepts of Operating System Structure, Operations and Services.
- Design new techniques for Multithreaded Programming, Process Scheduling and Synchronization.
- Apply the skills of deal lock prevention and avoidance.
- Design and implement Memory management Algorithms.
- Explain the concept of file systems.

### Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: “Operating System Principles”, Wiley India, Chapters (1-12), 8<sup>th</sup> Edition, 2009. ISBN: 9781118063330.

### Reference Books:

1. D.M Dhamdhere: “Operating systems - A concept based Approach”, Tata McGraw-Hill, 2<sup>nd</sup> Edition, 2002. ISBN: 978-0-07-295769-3.
2. P.C.P. Bhatt: “Introduction to Operating Systems: Concepts and Practice”, (Chapters: 1, 2, 31 to 3.4 , 4.1 to 4.4, 5.1 to 5.5, 6.1 to 6.7, 7, 8.1 to 8.6, 9.1 to 9.6, 10, 11.1 to 11.5, 12.1 to 12.6, 14.1 to 14.8, 21.1 to 21.9) , PHI, 4th Edition, 2008. ISBN: 978-81-203-4836-3.
3. Harvey M Deital: “Operating systems”, Pearson Education, 3<sup>rd</sup> Edition, 1990, ISBN: 978-0131828278.

### E-Resources:

1. <http://nptel.ac.in/courses/106108101/>
2. <http://study.com/academy/lesson/computer-operating-systems-managing-hardware-and-software-resources.html>



## Software Engineering and Testing

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST54	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Understand the real world applications with the aid of software engineering techniques along with professional ethics and responsibilities.
- Understand the importance of SDLC life cycle in realtime.
- Learn Software and Hardware Testing.

### Syllabus

#### Module – I

**Introduction:** FAQ's about software engineering, Professional and ethical responsibility. Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems. Critical Systems: A simple safety critical system; System dependability; Availability and reliability

**08 Hours**

#### Module – II

**Requirements and Project Management:** Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The software requirements document. Project Management: Management activities; Project planning; Project scheduling.

**08 Hours**

#### Module – III

**Software Development and Verification and Validation:** Agile methods; Extreme programming; Rapid application development. Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods.

**08 Hours**

#### Module – IV

**A Perspective on Testing, Examples:** Basic definitions, Test cases, Software testing: Component testing; Test case design; Test automation, Levels of testing.

**Boundary Value Testing:** Boundary value analysis, Robustness testing, Worst-case testing, Special value testing.

**08 Hours**

#### Module – V

Equivalence Class Testing, Decision Table- Based Testing: Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations.

**Path Testing, Data Flow Testing:** DD paths, Test coverage metrics, Basis path testing.

**08 Hours**

### Course Outcomes:

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

- Apply the real world applications with the aid of software engineering techniques along with professional ethics and responsibilities.
- Explain the requirements engineering process, feasibility studies and its validation.
- Design software in structured, organized ways and demonstrate effective, practical ways to design and develop high quality software.
- Write Test cases , Test plan based on test scenario.
- Analyze using static analysis tools (Inspection, walk through and peer review) and automate high quality tests during unit and integration testing.

### Text Book:

1. Ian Sommerville: "Software Engineering", 8<sup>th</sup> Edition, Pearson Education, 2007, ISBN-13: 978-0137035151.
2. Paul C. Jorgensen: "Software Testing, A Craftsman's Approach", 3<sup>rd</sup> Edition, Auerbach Publications, 2008, ISBN: 9781439889510.

### Reference Books:

1. Roger S Pressman: "Software Engineering - A Practitioners approach", 7<sup>th</sup> Edition, McGraw Hill, 2007.
2. Pankaj Jalote: "An Integrated Approach to Software Engineering", Wiley India, 2009.
3. Myers GJ: "The Art of Software testing", Wiley-Dreantech India Pvt. Ltd., 2004.
4. Loise Tamres: "Introducing Software Testing", Pearson Education, 2003.



## Advanced Algorithms (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI551	3-0-2-0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable students to :

- Learn methods for solving recurrences, which are useful for describing the running times of recursive algorithms.
- Understand the graph search algorithms and network flow problems.
- Gain knowledge about number - theoretic algorithms
- Get exposed to string - matching algorithms.
- To introduce probabilistic analysis and randomized algorithms.

### Syllabus

#### Module – I

**Introduction:** The role of algorithms in computing, Growth of Functions: Asymptotic notations; Standard notations and common functions; Methods for solving recurrences: The substitution method, The recurrence – tree method, The master method.

**Amortized Analysis:** Aggregate, Accounting and Potential Methods. **09 Hours**

#### Module – II

**Graph Algorithms:** Introduction to Single – Source shortest paths: Variants, negative weight edges, Cycles, Representing Shortest paths, Relaxation, Bellman - Ford Algorithm; Single source shortest paths in a DAG; Dijkstra’s algorithm, Johnson’s algorithm.

**Maximum Flow:** Flow networks and Ford-Fulkerson method; Maximum bipartite matching **09 Hours**

#### Module – III

**Number - Theoretic Algorithms:** Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing. **08 Hours**

#### Module – IV

**String-Matching Algorithms:** Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms. **07 Hours**

## Module – V

**Polynomials and the FFT:** Representation of polynomials, The DFT and FFT, Efficient implementation of FFT. **07 Hours**

### Laboratory

**Note: The following programs can be executed on C/C++ .**

1. Design, develop, and run a program to implement the Bellman-Ford algorithm
2. Design, develop, and run a program to implement a Monte Carlo algorithm to test the primality of a given integer.
3. Design, develop, and run a program to solve modular linear equations.
4. Design, develop, and run a program to solve string matching problem using naïve approach and the KMP algorithm.
5. Design, develop, and run a program to solve String matching problem using Finite Automata
6. Design, develop, and run a program to solve String matching problem using Robin Karp algorithm.

### Course Outcomes

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

- Explain different asymptotic notations and their use in modern computing systems.
- Design and apply iterative and recursive algorithms.
- Design and implement graph and flow network algorithms.
- Design and analyze the algorithms for string matching.
- Describe the representation of polynomials, the DFT and also the implementation of FFT.

### Text Books:

1. T. H Cormen, C E Leiserson, R L Rivest, C Stein: "Introduction to Algorithms", ( Chapters 1,3,4,17,24-26,30,31,32 ), Prentice-Hall of India, 3<sup>rd</sup> Edition, 2010, ISBN: 9780262259460.
2. Kenneth A. Berman, Jerome L. Paul: "Algorithms", (Chapters 1,11,20), Cengage Delmar Learning, India, 2002, ISBN: 9788131505212.

### Reference Book:

1. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: "Fundamentals of Computer Algorithms", 2<sup>nd</sup> Edition, Universities Press, 2007, ISBN: 9788173716126

**E-Resources:**

1. <http://staff.ustc.edu.cn/~csl/graduate/algorithms/book6/chap02.htm>
2. <http://www.cs.cornell.edu/courses/cs3110/2011sp/lectures/lec20-amortized/amortized.htm>
3. <http://staff.ustc.edu.cn/~csl/graduate/algorithms/book6/chap18.htm>
4. [https://en.wikipedia.org/wiki/Category:Graph\\_algorithms](https://en.wikipedia.org/wiki/Category:Graph_algorithms)
5. <http://staff.ustc.edu.cn/~csl/graduate/algorithms/book6/chap18.htm>
6. <http://staff.ustc.edu.cn/~csl/graduate/algorithms/book6/chap33.htm>
7. [https://en.wikipedia.org/wiki/String\\_searching\\_algorithm](https://en.wikipedia.org/wiki/String_searching_algorithm)



## Object Oriented Programming with JAVA

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI552	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable the students to :

- Understand the basic concepts of Java Technology and its features.
- Understand the OOPs concepts.
- Learn methods for solving programs in Java.
- Effectively use data structures like Collections, Lists, etc.
- Write defensive programming using Exception Handling.

### Syllabus

#### Module – I

**Introduction to Java:** Why Java, Flavors of Java, Java Designing Goal and Features, JVM / JDK / JRE / History of JDK / JDM, Usage of IDE (Eclipse, NetBeans)

**Language Fundamentals:** Data Types - Variables, keywords, operators; Selection / Iterative / Decision making statements

**Introduction to OOPs Concepts:** Inheritance - Polymorphism - Abstraction – Encapsulation **10 Hours**

#### Module – II

**Arrays and Strings:** Defining of an Array, Initializing and accessing an Array, Multi-Dimensional Array, String / StringBuffer / StringBuilder

**OOPs in Java:** Inheritance, Abstract class and interface, Abstract class Vs Interface

**Packages and Wrapper Classes:** Defining Package, Organizing Classes and interfaces in Packages, Package as Access Protection, Import and Static Import, Naming Convention for packages, What is Wrapper Class, Why Wrapper, How to handle wrapper Classes. **10 Hours**

#### Module – III

**Exception Handling:** What is Exception, Types of Exception, Exception Hierarchy, Custom exceptions.

**The Collection Framework:** Collection of objects, Collection Interfaces and Hierarchy, List and Map, Types of List, Types of Map, Iterator, Generics. **08 Hours**

#### Module – IV

**Threads:** Understanding Threads, Needs of Multi-Threaded Programming, Thread Life-cycle, Synchronizing Threads. **02 Hours**

## Module – V

**Project Work:** To create a Contact Book application using the Core Java concepts learnt with special emphasis on OOPs concepts, Exception Handling, and Collections Framework. **10 Hours**

### Laboratory

1. Programs covering Data Types and OOPs Concepts.
2. Programs covering Arrays and Strings, OOPS concepts in Java, Packages and Wrapper Classes.
3. Programs covering Exception Handling, The Collection Framework and Threads.

### Course Outcomes:

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

- Explain the basic concepts of Java Technology and its features.
- Explain the OOPs concepts.
- Write programs in Java.
- Analyze data structures like Collections, Lists, etc.
- Write defensive programming using Exception Handling.

### Text Books:

1. Herbert Schildt: “Java: The Complete Reference”, McGraw Hill Education, 9<sup>th</sup> Edition, ISBN-10: 9339212096.
2. Dr. R. Nageswara Rao: “Core Java: An Integrated Approach”, 1<sup>st</sup> Edition, Dreamtech Press, 2016, ISBN-10: 9351199258.

### Reference Books:

1. Joshua Bloch: “Effective Java”, Pearson Education, 2<sup>nd</sup> Edition, ISBN-10: 933257653X.
2. Cay S. Horstmann: “Core Java - Vol. I - Fundamentals”, 10<sup>th</sup> Edition, Pearson Education, ISBN-10: 9332582718.



## Computer Graphics (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI553	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable the students to :

- Understand the basic principles of Computer graphics using OpenGL libraries.
- Learn methods to implement the algorithms and techniques necessary to produce basic 2D and 3D objects.
- Acquire knowledge on Graphical user interface.
- Study various operations on 2D and 3D objects like translation, scaling and rotation.
- Understand how to produce realistic images by position the camera coordinates, viewing angles, light and shade.

### Syllabus

#### Module – I

**Introduction to Computer Graphics:** What is computer graphics?, Where computer graphics is used, Elements of pictures created in computer graphics, graphics display devices, graphics input primitives and devices. Initial steps in drawing figures: To get started making pictures, the OpenGL basic graphics primitives, line drawing in OpenGL, simple interaction with mouse and keyboard, designing menus. Additional drawing tool: Introduction, world windows and viewports. **10 Hours**

#### Module – II

**From vertices to fragments:** Basic Implementation Strategies; Four major tasks; Clipping; Line-segment clipping; Polygon clipping; Rasterization; Bresenham's algorithm; Polygon Rasterization; Hidden-surface removal; Antialiasing; Display considerations. **07 Hours**

#### Module – III

**Transformation of Objects:** Introduction to transformations, 3D affine transformations, how to change coordinate systems, affine transformations used in a program, to draw 3D scenes with OpenGL, Modelling shapes with polygonal meshes: Introduction to solid modelling with polygonal meshes. **08 Hours**

#### Module – IV

**Three Dimensional Viewing:** The camera revisited, to specify a camera in a program, perspective projection of 3D objects, to produce stereo views, taxonomy of projections. **07 Hours**

#### Module – V

**Rendering faces for visual realism:** Introduction, introduction to shading models, flat shading and smooth shading, adding hidden surface removal, to add texture to faces, to add shadows of objects, OpenGL 2.0 & the shading language(GLSL) **08 Hours**

## Laboratory

### Part-A

1. Plotting functions using dot plots.
2. Drawing the checkerboard.
3. Draw rubber rectangles: those that grow and shrink as the user moves the mouse.
4. Cohen Sutherland line clipping algorithm.
5. 3D scene rendered with shading.

### Part-B

Develop a suitable graphics package to implement the skills learnt in the theory and the exercises indicated in Part-A. Use the OpenGL libraries

### Course Outcomes:

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

- Design simple graphical user interface using OpenGL libraries.
- Implement basic 2D and 3D object using various rasterization and filling algorithms.
- Perform various transformation on 2D and 3D objects.
- Apply camera coordinate and decide the viewing angles for 2D and 3D objects.
- Apply light and shading to render faces for visual realism.

### Text Books:

1. F.S. Hill, Jr, Stephen M. Kelley: “Computer Graphics Using OpenGL” (Chapters 1,2, 3.1,3.2,5,6.2,7,8), 3<sup>rd</sup> Edition, Pearson Education, 2009, ISBN: 978-81-317-2414-9.
2. Edward Angel: “Interactive Computer Graphics A Top-Down approach with OpenGL” (Chapter 7), 5<sup>th</sup> Edition, Pearson Education, 2009, ISBN: 978-81-317-2530-6.

### Reference Books:

1. James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes: “Computer Graphics”, Pearson Education, 1997.
2. Donald Hearn and Pauline Baker: “Computer Graphics - OpenGL Version”, 3<sup>rd</sup> Edition, Pearson Education, 2004.

### E-Resources:

1. <http://www.nptelvideos.in/2012/11/computer-graphics.html>
2. [https://www.tutorialspoint.com/computer\\_graphics/](https://www.tutorialspoint.com/computer_graphics/)
3. [www.graphics.cornell.edu/online/tutorial/](http://www.graphics.cornell.edu/online/tutorial/)



## Operations Research

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST561	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

### Course Objectives:

This course will enable students to :

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

### Syllabus

#### Module – I

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

**Linear Programming:** Prototype Example; The Linear Programming Model; Assumptions of Linear Programming; Additional Examples. **08 Hours**

#### Module – II

**The Simplex Method:** The Essence of the Simplex Method; Setting Up the Simplex Method; The Algebra of the Simplex Method; The Simplex Method in Tabular Form; Tie Breaking in the Simplex Method; Adapting to Other Model Forms.

**Duality Theory:** The Essence of Duality Theory; Primal-Dual Relationships; Adapting to Other Primal Forms; The Dual Simplex Method. **08 Hours**

#### Module – III

**Transportation and Assignment Problems:** The Transportation Problem; The Assignment Problem. **08 Hours**

#### Module – IV

**Project Management with PERT/CPM:** A Prototype Example- The Reliable Construction Co. Project; Using a Network to Visually Display a Project; Scheduling

a Project with PERT/CPM; Dealing with Uncertain Activity Durations; Considering Time-Cost Trade-Offs; Scheduling and Controlling Project Costs; An Evaluation of PERT/CPM.

**08 Hours**

### Module – V

**Game Theory, Decision Analysis:** Game Theory: The Formulation of Two-Person, Zero-Sum Games; Solving Simple Games--A Prototype Example; Games with Mixed Strategies; Graphical Solution Procedure; Solving by Linear Programming; Extensions.

**Decision Analysis:** A Prototype Example; Decision Making without Experimentation; Decision Making with Experimentation; Decision Trees.

**08 Hours**

### Course Outcomes

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

- Develop Linear Programming models, interpret the models, solutions and infer solutions to the real-world problems.
- Solve the Linear problems by applying different techniques of Operations research.
- Build and solve Transportation models and Assignment models.
- Design new simple models like CPM to improve decision making and use critical path analysis, programming evaluation and review techniques for timely project scheduling and completion.
- Compare the characteristics of different types of decision making environments and the appropriate decision making approaches and tools to be used in each type.

### Text Books:

1. Frederick S. Hillier, Gerald J. Lieberman: “Introduction to Operations Research: Concepts and Cases”, 8<sup>th</sup> Edition, Tata McGraw Hill, 2005, ISBN-13: 978-0-07-060092-8, (Chapters: 1.1 to 1.3, 2, 3.1 to 3.4, 4.1 to 4.6, 6.1 to 6.4, 7.1, 8,10, 14.1 to 14.6, 15.1 to 15.4).

### Reference Books:

1. S D Sharma: “Operations Research”, KedarNath RamNath, 2007.
2. Hamdy A Taha: “Operations Research, An Introduction”, 8<sup>th</sup> Edition, Pearson Education, 2007, ISBN: 81-203-2235-5.
3. Richard Bronson, Govindasami Naadimuthu: “Operations Research”, SCHAUM’S Outlines, 2<sup>nd</sup> Edition, Tata Mcgraw-hill Edition, ISBN-13: 978-0-07-058400-6, ISBN-10: 0-07-058400-1.

### E-Resources:

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



## Computer Networks Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSL57	1-0-2-0	2	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Become familiar with the working of network topology.
- Understand working of Ethernet LAN.
- Understand the concepts of mobile routing.
- Become familiar with the basics of TCP/IP.
- Understand the concepts of network security.

### Part A

#### Simulation Exercises

**The following experiments shall be conducted using either NS228/OPNET or any other suitable simulator.**

1. Simulate a three nodes point - to - point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate a four node point-to-point network with the links connected as follows:  $n_0 - n_2$ ,  $n_1 - n_2$  and  $n_2 - n_3$ . Apply TCP agent between  $n_0 - n_3$  and UDP between  $n_1 - n_3$ . Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.
3. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
4. Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
5. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.
6. Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

### Part B

**Implement the following in C/C++:**

7. Write a program for error detecting code using CRC-CCITT (16- bits).
8. Write a program for distance vector algorithm to find suitable path for transmission.

- Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
- Implement the above program using as message queues or FIFOs as IPC channels.
- Write a program for simple RSA algorithm to encrypt and decrypt the data.
- Write a program for congestion control using leaky bucket algorithm.

### Course Outcomes

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

- Analyse the working of network devices.
- Differentiate packet managements at different levels.
- Apply the knowledge of security algorithms.
- Discover shortest path using routing algorithms.
- Demonstrate the working of wireless networks.

### Text Books:

- Behrouz A. Forouzan: “Data Communication and Networking”, 5<sup>th</sup> Edition, Tata McGraw-Hill, 2012, ISBN: 978-0-07-337622-6.
- Alberto Leon-Garcia, Indra Widjaja: “Communication Networks -Fundamental Concepts and Key architectures”, 2<sup>nd</sup> Edition, Tata McGraw-Hill, 2004, reprint 2007, ISBN-13: 978-0-07-059501-9.
- Nader F. Mir: “Computer and Communication Networks”, 2<sup>nd</sup> Edition, Pearson Education, 2015, ISBN: 0133814742.

### E- Resources:

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



## Operating System Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSL58	1-0-2-0	2	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Learn different types of operating systems.
- Learn the concept of CPU scheduling algorithms used in operating system.
- Understand Bankers algorithm used for deadlock avoidance and prevention.
- Learn the concept of Inter process Communication.
- Gain knowledge of Producer Consumer Problem.

### Syllabus

**Note: The following programs can be executed on C/C++ any equivalent language or tool with suitable platform.**

1. Write a program to simulate the Round Robin Scheduling algorithm.
2. Write a program to implement the Shortest Job First algorithm.
3. Write a program to implement the First come First Serve algorithm.
4. Write a program to implement the Priority Scheduling algorithm.
5. Design and develop and run a program to implement Banker's algorithm.
6. Write a Program to implement Inter process Communication using Pipes.
7. Write a Program to implement Producer Consumer Problem.
8. Installation of Operating systems.

### Course Outcomes

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

- Explain different types of operating systems and installation process.
- Implement CPU scheduling algorithms used in operating system.
- Implement Bankers algorithm used for deadlock avoidance and prevention.

- Design and implementation of Inter process Communication.
- Solve Producer Consumer Problem.

**Reference Books:**

1. D.M Dhamdhere: “Operating systems - A concept based Approach”, Tata McGraw-Hill, 2<sup>nd</sup> Edition, 2002, ISBN: 978–0–07–295769–3.
2. P.C.P. Bhatt: “Introduction to Operating Systems: Concepts and Practice”, PHI, 4<sup>th</sup> Edition, 2008, ISBN: 978-81-203-4836-3.
3. Harvey M Deital: “Operating systems”, Pearson Education, 3<sup>rd</sup> Edition, 1990, ISBN: 978-0131828278.

**E-Resources:**

1. <http://nptel.ac.in/courses/106108101/>
2. <http://study.com/academy/lesson/computer-operating-systems-managing-hardware-and-software-resources.html>



## General Aptitude

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSH59	2:0:0:0	2	CIE:50 SEE:50	3 Hours	HSS

### Course Objectives:

This course will enable students to :

- Understand different types of Numerical / Arithmetical problems.
- Understand the different Data interpretation problems.

### Syllabus

#### Module – I

**Numerical Ability-I:** Numbers, HCF and LCM of numbers, Decimal Fractions, Average, Problems on Numbers, Problems on Ages. **06 Hours**

#### Module – II

**Numerical Ability-II:** Percentage, Profit and Loss, Ratio and Proportion, Partnership, Chain Rule, Time and Work. **05 Hours**

#### Module – III

**Numerical Ability-III:** Pipes and Cistern, Time and Distance, Problems on Trains, Alligation or Mixture, Simple Interest, Compound Interest. **05 Hours**

#### Module – IV

**Numerical Ability-IV:** Races and Games of Skill, Calender, Clocks, Permutations and Combinations, Probability, Odd man out and Series. **05 Hours**

#### Module-V

**Data Interpretation:** Tabulation, Bar Graphs, Pie Charts, Line Graphs. **05 Hours**

### Course Outcomes:

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

- Solve and analyze different types of Numerical / Arithmetical problems.
- Solve and analyze different Data interpretation problems.

### Text Books:

1. R S Aggarwal: “Quantitative Aptitude for competitive examinations”, (Chapters 1-3,6-8,10-18,20-22,26-28,30,31,35-39), S. Chand Publishing, New Delhi, 2014, ISBN-13: 978-81-219-2498-6.



**Sixth Semester B.E. - Syllabus****Unix System Programming**

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST61	3-0-0-0	3	CIE:50 SEE:50	3 Hours	FC

**Course Objectives:**

This course will enable students to :

- Learn about the UNIX and POSIX standards.
- Become familiar with files and process.
- Understand the different APIs and details of Unix processes.
- Become familiar with handling fork function and race condition.
- Learn about inter process communication between client and server.

**Syllabus****Module – I**

**Introduction:** UNIX and ANSI Standards: The ANSI C Standard, The POSIX Standards, UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics. UNIX Files: File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links. **08 Hours**

**Module – II**

**UNIX File APIs:** General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. UNIX Processes: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables. **08 Hours**

**Module – III**

**Process Control:** UNIX Kernel Support for Processes. Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, Race Conditions, exec Functions, Interpreter Files, system Function, Process Accounting, User Identification, Process Times. Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control. **08 Hours**

**Module – IV**

**Signals and Daemon Processes:** Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, Kill, Alarm, Interval Timers, **Daemon Processes:** Introduction, Daemon Characteristics, Coding Rules, Error Logging.

**Inter process Communication-1:** Introduction, Pipes, popen, pclose Functions, Coprocesses, FIFOs. **08 Hours**

### Module – V

**Inter process Communication-2:** System V IPC: Message Queues, Semaphores, Shared Memory. NETWORK IPC SOCKETS: Introduction; Socket Descriptors; Addressing; Connection establishment; Data transfer; Socket options; Out-of-band data; Nonblocking and asynchronous I/O. **08 Hours**

### Course Outcomes:

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

- Develop programs using UNIX/POSIX standards.
- Describe Unix APIs functions and Files.
- Analyse zombie process and job control.
- Explain UNIX kernel support for signals.
- Design and develop various IPC methods.

### Text Books:

1. Terrence Chan: “UNIX System Programming Using C++”, (Chapters 1.1, 1.4, 1.6, 5, 6, 7.1-7.6), Prentice Hall India, 1<sup>st</sup> Edition, 1999, ISBN: 9780133315622.
2. W. Richard Stevens, Stephen A. Rago: “Advanced Programming in the UNIX Environment”, (Chapters 7, 8.1-8.6, 8.9, 8.10, 8.12-8.16, 9.1-9.8, 13.1-13.4, 15.1-15.9, 16), Pearson Education / PHI, US, 2<sup>nd</sup> Edition, 2005, ISBN: 978-0321637734.

### Reference Books:

1. Marc J. Rochkind: “Advanced UNIX Programming”, Pearson Education, 2<sup>nd</sup> Edition, 2005.
2. Maurice J Bach, “The Design of the UNIX Operating System”, Pearson Education, 1<sup>st</sup> Edition, 1987.
3. Uresh Vahalia: “UNIX Internals: The New Frontiers”, Pearson Education, 1<sup>st</sup> Edition, 2001.

### E-Resources:

1. <http://weshakucysysh.comunidades.net/unix-systems-programming-communication>
2. <https://www.pearson.com/us/higher-education/program/Rochkind-Advanced-UNIX-Programming-2nd-Edition/PGM155399.html>
3. [http://www.ewitedu.in/k\\_course/usp6/](http://www.ewitedu.in/k_course/usp6/)



## System Software

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST62	3-0-0-0	3	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Learn fundamentals of system software.
- Gain knowledge about system software tool like assemblers.
- Understand the working of loaders and editors.
- Learn macroprocessors and its design.
- Study the concepts of Lex and Yacc programming.

### Syllabus

#### Module – I

**Machine Architecture:** Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples.

**Assemblers-1:** Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes. **08 Hours**

#### Module – II

**Assemblers-2:** Program Relocation, Machine Independent Assembler Features – Literals, Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking, Assembler Design Operations - One-Pass Assembler, Multi-Pass Assembler. **08 Hours**

#### Module – III

**Loaders and Linkers:** Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader;

**Editors and Debugging Systems:** Text Editors - Overview of Editing Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities. **08 Hours**

#### Module – IV

**Macro Processor:** Basic Macro Processor Functions - Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Machine-Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Keyword Macro Parameters, Macro Processor Design Options - Recursive Macro Expansion **08 Hours**

## Module – V

**Lex and Yacc:** Lex and Yacc - The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section, Running LEX and YACC, LEX and Hand- Written Lexers, Using LEX -Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line. **08 Hours**

### Course Outcomes

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

- Acquire the basic concepts of system software.
- Acquire skills with the working principle of one pass and multi-pass assembler.
- Analyze the function of loaders and editors.
- Analyze the concepts of macroprocessors.
- Design and develop lex and yacc programming.

### Text Books:

1. Leland.L.Beck: “System Software”, 3<sup>rd</sup> Edition, Pearson Education, 1997, (Chapters 1.1 to 1.3, 2 (except 2.5.2 and 2.5.3), 3 (except 3.5.2 and 3.5.3), 4 (except 4.4.3)), ISBN-10: 817758555, ISBN-13: 9788177585551.
2. John.R.Levine, Tony Mason and Doug Brown: “Lex and Yacc,” O’Reilly, SPD, 1998, (Chapters 1, 2 (Page 2-42), 3 (Page 51-65)), ISBN: 565920007, 9781565920002.

### Reference Book:

1. D.M.Dhamdhere: “System Programming and Operating Systems”, 2<sup>nd</sup> Edition, Tata McGraw - Hill, 1999, ISBN-13: 978-0072957693, ISBN-10: 0072957697.

### E-Resources:

1. [https://en.wikipedia.org/wiki/System\\_software](https://en.wikipedia.org/wiki/System_software)
2. <https://techterms.com/definition/systemsoftware>
3. [www.computerhope.com/jargon/s/systsoft.html](http://www.computerhope.com/jargon/s/systsoft.html)
4. [https://en.wikibooks.org/wiki/A...Program...Systems/System\\_software](https://en.wikibooks.org/wiki/A...Program...Systems/System_software)
5. <https://www.techopedia.com/definition/5476/system-software>



## Embedded Systems (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI63	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Understand the embedded system technologies and applications of embedded systems
- Understand the communication buses for device networks of embedded systems.
- Learn the various issues involved in real-time operating systems.
- Know how these systems can handle the tasks and scheduling of the tasks
- Learn about embedded systems associated design and software development tools.

### Syllabus

#### Module – I

**Introduction to Embedded Systems:** Embedded systems; Processor embedded into a system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded System-on-Chip (SoC), Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer. **10 Hours**

#### Module – II

**Communication Buses for Device Networks:** Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols. **07 Hours**

#### Module – III

**Real Time Operating Systems-1:** Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment and handling of interrupt source calls. **08 Hours**

#### Module – IV

**Real Time Operating Systems-2:** Real-Time Operating Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues. **08 Hours**

#### Module –V

**Embedded Software Development Tools:** Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system;

Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools.

**07 Hours**

### List of Lab programs:

1. Intrusion detection in TCP/IP networks using immune systems paradigm and neural network detectors.
2. Network Tapping System Based on Customized Embedded Linux: Design and Implementation.
3. Network Intrusion Detection System Based on Embedded System - Off-line and On-line NIDS Based on Embedded System: Design and Implementation.
4. Packet Features Extractor for Network Security Systems: Design and Implementation.
5. Draft of Design and Implementation FSK Remote Control System Using ATmiga16 Microcontroller.
6. Text Code of Tx Rx remote control ATmiga16 Microcontroller.

### Course Outcomes:

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

- Describe the embedded system technologies and applications of embedded systems
- Differentiate communication buses for device networks of embedded systems
- Solve issues involved in real-time operating systems.
- Manage tasks scheduling of embedded systems.
- Design software development tools.

### Text Book:

1. Raj Kamal: "Embedded Systems: Architecture, Programming and Design", Tata McGraw-Hill Education, 2011, ISBN-10- 0-070-66764-0, ISBN-13: 978-0-070-66764-8, (Chapters 1-5,7-9,11,12).

### Reference Book:

1. Shibu K V: "Introduction to Embedded Systems", Tata McGraw Hill, 2009, ISBN-10: 0070678790, (Chapters 1,2,4,6-10).

### E-Resources:

1. <http://info300.net/skhourisources.html>
2. <http://embedded-computing.com/articles/safety-security-and-source-code-for-industrial-embedded-systems-no-shortcuts/>



## Data Mining (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI641	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable the students to :

- Understand the basic concepts, different types of data and data pre-processing methods.
- Understand the basic concepts and algorithms in association mining.
- Understand the different classification techniques.
- Identify the accuracy of diverse classifiers and predictors.
- Identify the appropriate clustering techniques for the given data sets.
- Familiarize with the various applications of Data Mining.

### Syllabus

#### Module – I

**Data Mining:** Introduction, Challenges, Data Mining Tasks, Types of Data, Data Quality- Measurements and data collection errors, precision, bias, accuracy, missing value, inconsistent values, noise and artifacts, outliers, duplicate data, Data Preprocessing- aggregation, sampling, dimensionality reduction, discretization and binarization, Variable transformation. **08 Hours**

#### Module – II

**Association Analysis:** Association Analysis- Basic Concepts & Algorithms: Frequent Item set Generation. Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm, Evaluation of Association Patterns–Objective Measures of Interestingness. **08 Hours**

#### Module – III

**Classification:** Basics, General approach to solve classification problem, Decision Trees Induction, Rule based classifiers, Nearest Neighbour Classifiers, Bayesian Classifiers, Artificial Neural Networks (ANN). **08 Hours**

#### Module – IV

**Clustering Techniques:** Overview, Features of cluster analysis, Types of Data & Computing Distance (Measures of Similarity & Dissimilarity), Different types of Clustering, Different types of clusters, K-means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation-Overview. **08 Hours**

#### Module – V

Mining different types of data: Text Mining-Text data analysis & informational retrieval, text mining approaches, Mining the world wide web-Mining web page

layout structure, Mining web's link structures, Web usage mining. Applications: Finance, Retail Industry, Intrusion detection.

**08 Hours**

## Laboratory

### Part – A

1. Working with the Weka tool/ Rapid Miner Tool/R Tool

Step 1: Dataset Creation

Step 2: Preprocessing

The preprocessing techniques that can be applied are as follows:

- a. Handling of Missing values for categorical and numerical values
- b. Redundancy Techniques.

Step 3: Perform the following on the preprocessed dataset:

- a. Association mining
- b. Decision Tree Classification
- c. Naïve Bayes Classification

### PART - B

1. Write a java/C++ program to perform aggregation and discretization on a given dataset.
2. Write a java/ C++ program to identify the frequent subsets from a frequent item set.
3. Write a java/ C++ program to identify strong rules from a set of rules given the confidence and support thresholds.
4. Write a java/ C++ program to implement the information gain and gini index measures to identify the best attribute to split.
5. Write a java/ C++ program to construct a Naïve Bayesian classifier for a given dataset.
6. Write a java/ C++ program to perform k-means clustering on numeric dataset.

### Course Outcomes

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

- Illustrate the data and various data preprocessing techniques.
- Design association mining approaches and analyze them.
- Design data classification methods and measures for evaluation.
- Generate clusters from the data using similarity measures.
- Apply data mining approaches in text and web and identify the applications of data mining.

**Text Books:**

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: “Introduction to Data Mining”, Pearson Education, 2005.
2. Jiawei Han and Micheline Kamber, (Chapters 1,2.1,2.2,2.3,4.1,5.1-5.4,6.1-6.7,8.1-8.5,10.3,10.4,10.5), Pearson Education, 2005, ISBN:032-132-1367.
3. Morgan Kaufmann: “Data Mining - Concepts and Techniques”, 2<sup>nd</sup> Edition, Publisher, 2006, (Chapters 10.3,10.4,10.5), ISBN:978-81-312-0535-8.

**Reference Book:**

1. G. K. Gupta: “Introduction to Data Mining with Case Studies”, 3<sup>rd</sup> Edition, PHI, New Delhi, 2009, ISBN: 978-8120330535.

**E-Resources:**

1. [www-users.cs.umn.edu/~kumar/dmbook](http://www-users.cs.umn.edu/~kumar/dmbook).
2. [www.cs.ccsu.edu/~markov/ccsu\\_courses/datamining-1.html](http://www.cs.ccsu.edu/~markov/ccsu_courses/datamining-1.html).
3. <https://www.pearson.com/us/higher...Introduction-to-Data-Mining/PGM93748.html>



## Database Concepts

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI642	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable the students to :

- Understand the basic concepts of database and Database Management System.
- Understand the difference between relational systems and non-relational systems.
- Get a clear understanding of how to maintain data (CRUD operations) in a relational database.
- Understand the working of a non-relational database.
- Get a clear understanding of how to maintain data (CRUD operations) in a non-relational database.
- Understand how Java programs can access database management systems using JDBC.

### Syllabus

#### Module – I

**Introduction to Database:** Relational Database, Schemaless Database.

**Introduction to SQL:** DDL, DML, DQL, TCL, DCL.

**Constraints:** Not null, Unique, Primary key, foreign key.

**08 Hours**

#### Module – II

**Operators and Functions:** Operators and Functions.

**Joins, Inner queries, Co-related queries:** Joins, Inner queries, Co-related queries.

**07 Hours**

#### Module – III

**JDBC:** JDBC API, Statement / Prepared Statements / Callable Statments, Result Set, CRUD operations.

**05 Hours**

#### Module – IV

**MongoDB:** Introduction and Installation, CRUD operations, Projections.

**06 Hours**

#### Module – V

**Project Work:** To create a Banking application using the concepts of database management systems with special emphasis on Java, JDBC, and MySQL database.

**14 Hours**

## Laboratory

1. Programs covering SQL, Constraints, Operators and Functions, Joins, Inner queries, Co-related queries.
2. Programs covering JDBC concepts.
3. Programs covering MongoDB concepts.

## Course Outcomes

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

- Explain the basic concepts of database and Database Management System.
- Differentiate between relational systems and non-relational systems.
- Describe how to maintain data (CRUD operations) in relational and non-relational database.
- Manage Java programs to access database management systems using JDBC.
- Save and retrieve data in a safe and consistent manner.

## Text Books:

1. Rajiv Chopra: “Database Management Systems (DBMS)”, 5<sup>th</sup> Edition, S Chand Publishing, ISBN-10: 9385676342.
2. Kristina Chodorow, Shroff: “MongoDB: The Definitive Guide”, 2<sup>nd</sup> Edition, ISBN-10: 9351102696.

## Reference Books:

1. Raghu Ramakrishnan: “Database Management Systems (Asia Higher Education Engineering/Computer Science)”, 3<sup>rd</sup> Edition, McGraw Hill Education, ISBN-10: 007123151X.
2. Kyle Banker, Peter Bakkum, Shaun Verch: “MongoDB in Action: Covers MongoDB Version 3.0”, 2<sup>nd</sup> Edition, Dreamtech Press, ISBN-10: 9351199355.



## Soft Computing (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSI643	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable students to :

- Learn the fundamentals and major concept of Soft Computing and Neural Network.
- Study various architecture and phases of Neural Network.
- Extend the knowledge of Fuzzy Logic, Genetic Algorithms.
- Study the concepts of Hybrid Systems.
- Learn necessity in engineering field.

### Syllabus

#### Module – I

**Introduction:** Introduction to Soft Computing, Historical Development, Definitions, advantages and disadvantages, solution of complex real life problems. **07 Hours**

#### Module – II

**Neural Network:** Introduction – Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network. Supervised Learning Network: Perceptron Networks – Adaline – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network. **09 Hours**

#### Module – III

**Fuzzy Logic:** Introduction to Classical Sets and Fuzzy sets – Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations – Noninteractive Fuzzy sets – Membership Functions: Fuzzification – Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods. **07 Hours**

#### Module – IV

**Genetic Algorithms:** Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming. Applications of Soft Computing: A Fusion Approach

of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach- Genetic Algorithm based Internet Search Technique – Soft Computing based Hybrid Fuzzy Controllers – Soft Computing based Rocket Engine – Control. **09 Hours**

### Module –V

**Hybrid Systems:** Genetic Algorithm based Backpropagation Network, Fuzzy – Backpropagation, Fuzzy Logic Controlled Genetic Algorithms. **07 Hours**

### Laboratory

#### List of Experiments: (Work in Computation lab)

1. Problems based on GA and its applications in transportation.
2. Problems based on Fuzzy logic and its applications in transportation.
3. Problems based on ANN and its applications in transportation.
4. Problems based on hybrid systems and its application in transportation.

#### Design based Problems (DP)/Open Ended Problem:

1. Solving routing problem of mass transit system using GA
2. Developing trip generation relationship using ANN
3. Developing mode choice model using Fuzzy Logic
4. Obtaining optimal mix design of Bituminous Concrete using GA or Hybrid system

#### Course Outcomes:

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

- Implement the knowledge of Neural Network.
- Implement Fuzzy Sets, fuzzification, defuzzification.
- Design solutions for problems regarding probability, Mutation of crossover, convergence and Encoding.
- Use the soft computing techniques for daily problems.
- Implementation of soft computing and importance in engineering field.

#### Text Books:

1. S.N. Sivanandan, S.N. Deepa: “Principles of Soft Computing”, (Chapters 1-15), Wiley India, 2007, ISBN-10: 81-265-1075-7.

2. S. Rajasekaran, G.A. Vijayalakshmi Pai: "Neural Network, Fuzzy Logic, and Genetic Algorithms - Synthesis and Applications", (Chapters 1-15), Prentice Hall, Page 1-435, 2005, ISBN: 8120321863.
3. Sinha, N.K., Gupta, M. M.: "Soft Computing and Intelligent Systems Theory and Applications", (Chapters 1-25), Academic Press, Page 1-625, 2000, ISBN-10: 0126464901, ISBN-13: 9780126464900.

### Reference Books:

1. Fakhreddine karray, Clarence de Silva: "Soft Computing and Intelligent Systems Design - Theory, Tools and Applications", (Chapters 1-10), Addison Wesley, Page 1-533, 2004.
2. Klir, G. J. and Yuan, B.: "Fuzzy Sets and Fuzzy Logic: Theory and Applications", Prentice Hall, 1995.

### E-Resources:

1. [https://link.springer.com/referenceworkentry/10.1007/978-0-387-30440-3\\_15](https://link.springer.com/referenceworkentry/10.1007/978-0-387-30440-3_15)
2. <http://www.faadooengineers.com/threads/9513-Soft-computing-full-notes-pdfs-ebooks>



## Artificial Intelligence

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CST651	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

### 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; Backtracking 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**

**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.

**Text Book:**

1. Stuart Russel, Peter Norvig: “Artificial Intelligence A Modern Approach”, 2<sup>nd</sup> 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”, 3<sup>rd</sup> 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-e-books/>



## LabVIEW - Level I

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE661	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

This course will enable students to :

- Understand the fundamental of graphical coding system.
- Learn to develop basic level of LabVIEW coding.
- Study the different component of LabVIEW operating tools.
- Study and develop state machine for a specific problem.
- Develop integrated coding solution for analysis and presentation with MyRio hardware using accelerometer.

### Syllabus

#### Module - I

**LabVIEW programming concepts, environment and Software constructs:** Data flow, Polymorphism, Front panel window, block diagram, and connector pane, Menus and palettes, Configuration options. Controls, indicators, IO controls, and refnums Terminals, constants, nodes, update modes, and legends of charts and graphs. Mechanical action of Boolean objects Property Nodes. Numeric, string, Boolean, and path data types. Array and cluster data types. Shift registers, Case, Sequence and Event structures. **10 Hours**

#### Module - II

**Programming, Data communication and synchronization VIs and functions:** Conversion, comparison, and manipulation, Timing and Timing functions related to Timed structures. Data storage and file I/O formats, Waveform and waveform file I/O, Dynamic and User events Local, global, and shared variables Data Socket TCP and UDP Notifiers Queues Semaphores Property Nodes, and Invoke Nodes. **08 Hours**

#### Module - III

**Error handling VIs and functions:** Error clusters Dialog and User Interface VIs Custom error codes.

**Design patterns:** Simple state machine, User interface event handler, Queued message handler, producer/consumer (data) and producer/consumer (events), Functional global variables. **06 Hours**

## Module - IV

**Sub VI design:** SubVI creation methods, Connector panes and connection types, Polymorphic subVIs, Options related

**Debugging tools and techniques:** Debugging tools, Error list window, Execution highlighting, Breakpoints and single stepping, Generic and custom probes, Debugging practices and techniques for different situations. **08 Hours**

## Module - V

**VI design and documentation (style) practices:** Refer to the LabVIEW Style Checklist top of the LabVIEW Help for information on the following items

- i. User interface design and block diagram layout
- ii. Modular and hierarchical design
- iii. SubVI icons and connector pane layout (standard)
- iv. Properties
- v. Documenting Vis

### Memory, performance, and determination

- a. Tools for identifying memory and performance issues  
Profile memory and performance, Show buffer allocations and VI metrics
- b. Programming practices

Enforcing dataflow, User interface updates and response to user interface controls, Data type selection, coercion, and buffer allocation, Array, string, and loop operations **08 Hours**

### Course Outcomes:

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

- Formulate basic aspects of the graphical programming using LabVIEW 2016.
- Develop LabVIEW coding for a specific problem of datalogging, measurement and presentation.
- Handle the error function and errors in the LabVIEW coding.
- Develop coding for data handling and Analysis on the acquired data.
- Design a state machine LabVIEW coding for an applied problem.

**Text Books:**

1. "LabVIEW - Getting Started with LabVIEW", M/s National Instruments, 2013 373427J-01.
2. Jovitha Jerome: "Virtual instrumentation using labview", PHI Learning Pvt. Ltd., 2010.
3. Hans-Petter Halvorsen: "Introduction to LabVIEW," University College of Southeast, Norway.
4. S. Sumathi, P. Surekha, "LabVIEW based Advanced Instrumentation Systems", Springer.
5. Lab manual provided by Dept. of Civil Engg., NCET.

**Reference Books:**

1. Jeffrey Travis, Jim Kring: "Introduction to Graphical Programming with LabVIEW", Pearson, 2006.
2. Malan Shiralkar: "LabVIEW Graphical Programming Course Collection", National Instruments.

**E-Resources:**

1. <http://cnx.org/content/col10241/1.4>.

## Yoga and Meditation

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE662	2:0:0:4	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 well being.
- 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 Asanas: standing, sitting and supine asanas. Standing Asanas (Trikon asan, padhastasan, ardhachakrasan, veerbhadrasan), Sitting Asanas ( Vajrasan, padmasan, suptavajrasan, Ardhamaschendrasan, vakrasan), Supine Asanas (Sarvangasan, Matsyasan, Natarajasan, Shavasana) **08 Hours**

#### 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. **08 Hours**

#### 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. **08 Hours**

#### 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, Vrksasana, Baddha Konasana. **08 Hours**

## Module – V

**Meditation:** Meaning of meditation, Meditation vs Concentration, Advantages of Meditation, Effects of Meditation on body and mind, Effect on health and general well being, Reducing stress through meditation, Increasing concentration, Improving communication, Effect on Environment **08 Hours**

### 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.

### Text Books:

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".



## Martial Arts

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE663	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

The following types of Martial arts are offered,

1. Karate
2. Taekwondo
3. Judo
4. Kung-fu

Expert Trainers will be provided during the academic year through experts in Martial Arts. Students who enroll for this elective should attend the regular Training classes and maintain a minimum of 85% attendance.

At the end of the training programme the performance Evaluation will be made by team of experts. Students who secure at least a satisfactory grade will be issued a certificate and deemed to have been completed the above said 3 Credit course. However, the students who have shortage of attendance will be consider for the award of 3 credits provided they undergo training at any of the training centers in the above said Martial Arts, complete the certification programme and give a demo along with viva in the presence of experts in the campus.



## Music (Carnatic Vocal/Instrumental)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE664	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

This course will enable students to :

- Get familiarized with the conceptual understanding of Carnatic music.
- Gain knowledge about the basics of Swaravalis.
- Understand the use of different Talas.
- Gain understanding about various Raagas.
- Gain understanding about intricacies of Swaras.

### Syllabus

#### Module – I

**Theoretical Aspects:** Father of Carnatic music, Famous personalities in Carnatic music, Concept of Sapta Swara, Taala, Melody, Pitch, Rhythm, Janaka Raaga, Janya Raaga. **03 Hours**

#### Module – II

Sarale Varase (Any 5), Janti Varase (Any 5), Daatu Varase, Tara Stayi, Mandra Stayi. **08 Hours**

#### Module – III

**Alankaras:** Druva Taala, Matya Taala, Tripura Taala, Rupaka Taala, Jampe Taala, Atta Taala, Eka Taala. **08 Hours**

#### Module – IV

Geethagalu, Pillari Geethe (4), Sanchari Geethe (5), Lakshana Geethe (1). **10 Hours**

#### Module – V

Swarajatis (Any 2), Kalyani, Bilahari, Neelambari, Kamach.

Varna (Any 2), Shankarabara, Kalyani, Hamsadwani , Mohana. **10 Hours**

### Course Outcomes:

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

- Gain knowledge about the theoretical background of carnatic music
- Acquire practical knowledge on basics of Carnatic music.
- Practical demonstration of different Talas.
- Distinguish among various Raagas based on swara sthanas.
- To synchronize the Raaga and Taala.

### Text books:

1. Dr. Sachidevi: “Karnataka Sangeetha Darpana”, Sreenivasa Prakashana, Bengaluru, 2014.
2. Junior Carnatic Music – C Shiva Musicals, Malleshwaram, Bengaluru, 2013.

## Dance (Bharatanaty)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE665	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

This course will enable students to :

- Gain theoretical knowledge about various types of Indian dances.
- Understand about various musical instruments used in Bharatanaty.
- Learn Practical demonstrations of Bharatanaty steps on Prarthane Namaskara and Shlokas.
- Learn the movements of head, neck, eyes, hands according to Bharatanaty steps.
- Learn the brisk movements in Bharatanaty with the help of ADAVUS.

### Syllabus

#### Module – I

Indian Classical dance, It's history and Significance, Types of Classical Dance, Bharatanaty, Kathakali, Mohini Attam, Koochipudi, Katahak, Odissi, Manipuri.

**04 Hours**

#### Module – II

Musical Instruments used in Bharatanaty: Tabala, Mrudanga, Kamsale, Kolata, Taala vadya. Famous personalities in Bharatanaty, Composers of Natya Grantas.

**03 Hours**

#### Module – III

Practical exercises on Prarthane, Namaskara and Shloka, Vyayama Kriye for Bharatanaty (Two Shlokas and Two Prarthanes).

**10 Hours**

#### Module – IV

Abhinaya Steps (Chaturvidha) ShiroBedha, Drushti Bedha, Greeva Bedha, Brubedha, Hasta Bedha ( Samyuta and Asamyuta).

**10 Hours**

#### Module – V

Adavugalu (DashaVidha) Tattu adavu, Mettu Adavu, Nat Adavu, Egaru Tattu Adavu, Egaru Mettu adavu, Jaaru Adavu, Mandi adavu, TattuMettu Adavu, Rangakarma Adavu, Teermana Adavu.

**12 Hours**

### Course Outcomes:

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

- Get an insight into various types of Indian dances.
- Gain knowledge of different instruments used to perform dance.
- Perform exercises on prarthane, Namaskara according to Bharatanaty style.
- Perform basic steps in Abhinaya.
- Recognise and perform different Adavus.

### Reference Book:

1. "Bharatanaty shastra", Department of Public Instruction, Karnataka State Government.

## Sports

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17HOE666	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Students who are selected by the University to represent the VTU teams and for participating at State level / National level Sports in the following sports are exempted from taking open elective (Code:16HOE666 ) and will be awarded 3 credits.

Outdoor games	Indoor games
Cricket	Carrom
Foot ball	Chess
Hockey	Shuttle Badminton
Basket Ball	Squash
Kabbadi	Table – Tennis
Kho – Kho	Gymnastics
Hand – Ball	
Athletics	
Swimming	
Lawn Tennis	

The achievement in Sports as said above should have been made during the academic year during which the said open elective is offered.

After representing at VTU / State / National level in any of the above said sports, the students should produce the certificates from the competent authorities. Based on the certificates the institution will issue another certificate related to the achievement and awarding of three credits.

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## Unix System Programming Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSL67	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Learn UNIX environment efficiently.
- Understand and develop program to know system configuration options.
- Learn inter process communication technique.
- Understand and use of UNIX APIs.
- Learn the race condition.

### Syllabus

1. Write a C/C++ POSIX compliant program to check the following limits:
  - (i) No. of clock ticks
  - (ii) Max. no. of child processes
  - (iii) Max. path length
  - (iv) Max. no. of characters in a file name
  - (v) Max. no. of open files/ process
2. Write a C/C++ POSIX compliant program that prints the POSIX defined configuration options supported on any given system using feature test macros.
3. Consider the last 100 bytes as a region. Write a C/C++ program to check whether the region is locked or not. If the region is locked, print pid of the process which has locked. If the region is not locked, lock the region with an exclusive lock, read the last 50 bytes and unlock the region.
4. Write a C/C++ program which demonstrates inter process communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.
5.
  - a) Write a C/C++ program that outputs the contents of its Environment list
  - b) Write a C / C++ program to emulate the unix ln command
6.
  - a) Write a C/C++ program to illustrate the race condition.
  - b) Modify the above program to avoid the race condition
7. Write a C/C++ program that creates a zombie and then calls system to execute the ps command to verify that the process is zombie.
8. Write a C/C++ program to avoid zombie process by forking twice.

9. Write a C/C++ program to implement the system function.
10. Write a C/C++ program to set up a real-time clock interval timer using the alarm API.

**Course Outcomes:**

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

- Implement POSIX feature test macros.
- Design system function.
- Examine emulation of ln command.
- Identify the zombie process.
- Design file and record locking concept.

**E-Resources:**

1. <http://weshakucysysh.comunidades.net/unix-systems-programming-communication>
2. <https://www.pearson.com/us/higher-education/program/Rochkind-Advanced-UNIX-Programming-2nd-Edition/PGM155399.html>
3. [http://www.ewitedu.in/k\\_course/usp6/](http://www.ewitedu.in/k_course/usp6/)



## Technical Aptitude and GD

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSH68	2:0:0:0	2	CIE:50 SEE:50	3 Hours	HSS

The respective branches shall conduct training programmes related to important and latest programming languages and other emerging technologies, such as Solar and Electric power based gadgets, IoT, ROBOT's, Environmental friendly and cost effective construction techniques, UAV's and technologies pertaining to the respective department.

**Seventh Semester B.E. – Syllabus****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.

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- 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", 1<sup>st</sup> 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)", 1<sup>st</sup> Edition, VPT, 2014.
2. Francis daCosta: "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1<sup>st</sup> 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, 1<sup>st</sup> Edition, 2011, ISBN-13: 978-1-4302-3297-1.
2. Sayed Hashimi, Satya Komatineni, Dave MacLean: “Pro Android 4”, Apress Springer India Pvt Ltd., 1<sup>st</sup> Edition, 2012, ISBN: 978-1-4302-3930-7.
3. Reto Meier: “Professional Android 2 Application Development”, Wiley India Pvt. Ltd., 1<sup>st</sup> 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", 2<sup>nd</sup> 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", 3<sup>rd</sup> Edition, Pearson Education, 2007, ISBN-13: 978-0201895513.

### E-Resources:

1. [https://www.tutorialspoint.com/object\\_oriented\\_analysis\\_design/ooad\\_functional\\_modeling.htm](https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_functional_modeling.htm)
2. [https://en.wikipedia.org/wiki/Object-oriented\\_analysis\\_and\\_design](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”, 3<sup>rd</sup> 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](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”, 2<sup>nd</sup> 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”, 2<sup>nd</sup> Edition, Dreamtech Press, ISBN-10: 9351199088.

### Reference Book:

1. Budi Kurniawan: “Servlet & JSP: A Tutorial”, 2<sup>nd</sup> 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), 5<sup>th</sup> 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”, 4<sup>th</sup> 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”, 3<sup>rd</sup> Edition, 2012, ISBN: 9381604320.

### Reference Books:

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

### E-Resources:

1. <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr/bt-dsstr-mtgtn-en.aspx>
2. [www.nrdms.gov.in/natural\\_disaster.asp](http://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”, 13<sup>th</sup> 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](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 airtsniff)
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", 3<sup>rd</sup> Edition, Pearson Education, 2007.
2. Michael E. Whiteman and Herbert J. Mattord: "Principles of Information Security", 2<sup>nd</sup> 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”, 1<sup>st</sup> Edition, Apress Springer India Pvt. Ltd., 2011, ISBN-13: 978-1-4302-3297-1.
2. Sayed Hashimi , Satya Komatineni, Dave MacLean; “Pro Android 4”, 1<sup>st</sup> Edition, Apress Springer India Pvt. Ltd., 2012, ISBN: 978-1-4302-3930-7.
3. Reto Meier: “Professional Android 2 Application Development”, 1<sup>st</sup> 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**

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

## 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.

<b>PEO1</b>	Graduates in Computer Science and Engineering will apply the technical knowledge of analysis and design of software used for sustainable societal growth.
<b>PEO2</b>	Graduates of Computer Science and Engineering will demonstrate logical thinking and programming skills.
<b>PEO3</b>	Graduates in Computer Science and Engineering will demonstrate good communication skills, dynamic leadership qualities with concern for environmental protection.
<b>PEO4</b>	Computer Science and Engineering graduates will be capable of pursuing higher studies, take up research and development work blended with ethics and human values.
<b>PEO5</b>	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)

<b>PO1</b>	<b>Engineering Knowledge:</b> Apply knowledge of mathematics and science, with fundamentals of Computer Science and Engineering to be able to solve complex engineering problems related to CSE.
<b>PO2</b>	<b>Problem Analysis:</b> Identify, Formulate, review research literature and analyze complex engineering problems related to CSE and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
<b>PO3</b>	<b>Design/ Development of solutions:</b> Design solutions for complex engineering problems related to CSE and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural societal and environmental considerations.

PO4	<b>Conduct Investigations of Complex problems:</b> 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.
PO5	<b>Modern Tool Usage:</b> Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to computer science related complex engineering activities with an understanding of the limitations.
PO6	<b>The Engineer and Society:</b> Apply Reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the CSE professional engineering practice.
PO7	<b>Environment and Sustainability:</b> Understand the impact of the CSE professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply Ethical Principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and Team Work:</b> Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary Settings.
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large such as able to comprehend and with write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO11	<b>Project Management and Finance:</b> Demonstrate knowledge and to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.
PO12	<b>Life-Long Learning:</b> Recognize the need for and have the preparation and ability to engage in independent and life-long learning the broadest context of technological change.