NAGARJUNA

COLLEGE OF ENGINEERING & TECHNOLOGY

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

2019-2020

Department of Information 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 INFORMATION 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

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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

PEO1: Pursue a successful career in the field of Information Science & Engineering or a related field utilizing his/her education and contribute to the profession as an excellent employee, or as an entrepreneur.

PEO2: Be able to work effectively in multidisciplinary environments and be responsible members/leaders of their communities

PEO3: The graduates of Information Science and Engineering Program should be able to establish an understanding of professionalism, teamwork, ethics, public policy that allows them to become good professional Engineers

PEO4: The graduates of Information Science and Engineering Program should be able to provide novel engineering solutions and efficient software designs with legal and ethical responsibility.

PEO5: Continuously improve by pursuing advanced degrees in engineering, business, or other professional fields through formal means or through informal self-study.

PROGRAM OUTCOMES (POs):

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

PO1: Engineering Knowledge:

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

PO2: Problem Analysis:

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

PO3: Design/Development of Solutions:

Design solutions for complex **Information 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 **Information 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 **Information 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 **Information Science and Engineering** practice.

PO7: Environment and Sustainability:

Understand the impact of the professional **Information 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 **Information 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 **Information 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 **Information 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 algorithms and write Information application programs in the areas related to information technology

PSO2: Problem-Solving Skills:

Ability to understand the ethics, human values for solving societal problems and environmental protection

PSO3: Foundation of mathematical concepts:

Ability to understand the software development skills and practical knowledge for promoting research, higher studies and entrepreneurship.

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
		Total		**25**	**20:2:8:0**	**800**

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
		Total		**25**	**21:0:8:0**	**800**

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**

Fifth Semester B.E. – Scheme

Sl. No.	Course Code	Course	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17IST51	Computer Networks	IS	3:0:0:0	3	100
2	17IST52	Microcontrollers	IS	3:0:0:0	3	100
3	17ISI53	Operating System (IC)	IS	3:0:2:0	4	100
4	17IST54	SoftwareEngineeringandTesting	IS	3:0:0:0	3	100
5	17ISI55X	Foundation Elective-IV(IC)	IS	3:0:2:0	4	100
6	17IST56X	Engineering Elective-V	IS	3:0:0:0	3	100
7	17ISL57	Computer Networks Laboratory	IS	1:0:2:0	2	100
8	17ISL58	Microcontroller Laboratory	IS	1:0:2:0	2	100
9	17ISH59	General Aptitude	IS/BS&H	2:0:0:0	2	100
TOTAL				22:0:8:0	26	900

Foundation Elective-IV (IC)

Sl. No.	Course Code	Course
1	17ISI551	Advanced Algorithms
2	17ISI552	Object Oriented Programming with JAVA
3	17ISI553	Compiler Design(NPTEL/MOOCS)

Engineering Elective-V / PBL

Sl. No.	Course Code	Course
1	17IST561	Operations Research
2	17IST562	Object Oriented Modeling and Design
3	17IST563	Computer Architecture (MOOCS)/ Information Security (MOOCS)

Sixth Semester B.E. – Scheme

Sl. No.	Course Code	Course	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17IST61	Unix System programming	IS	3:0:0:0	3	100
2	17ISI62	Android Programming (IC)	IS	3:0:2:0	4	100
3	17IST63	Embedded System	IS	3:0:0:0	3	100
4	17ISI64X	Foundation Elective-VI (IC)	IS	3:0:2:0	4	100
5	17IST65X	Engineering Elective-VII	IS	3:0:0:0	3	100
6	17HOE66X	Open Elective-VIII	IS/BS&H	2:0:0:4	3	100
7	17ISL67	Unix System programming Laboratory	IS	1:0:2:0	2	100
8	17ISH68	Technical Aptitude and GD	IS/BS&H	2:0:0:0	2	100
9	17ISP69	Mini project and Seminar	IS	2:0:0:0	2	100
Total				22:0:6:4	26	900

Foundation Elective-VI (IC)

Sl. No.	Course Code	Course
1	17ISI641	Distributed Computing System
2	17ISI642	Database Concepts
3	17ISI643	Computer Graphics and Multimedia

Engineering Elective-VII /PBL

Sl. No.	Course Code	Course
1	17IST651	Data Mining
2	17IST652	Artificial Intelligence
3	17IST653	Introduction to CSS3 (MOOCS)

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	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17IST71	Internet of Things	IS	3:0:0:0	3	100
2	17IST72	Image Processing	IS	3:0:0:0	3	100
3	17ISI73X	Foundation Elective-IX (IC)	IS	3:0:2:0	4	100
4	17IST74X	Engineering Elective-X	IS	3:0:0:0	3	100
5	17HOE75X	Open Elective-XI	IS/BS&H/ME	2:0:0:4	3	100
6	17HOE76X	Open Elective-XII	IS/BS&H	2:0:0:4	3	100
7	17ISL77	Internet of Things Laboratory	IS	1:0:2:0	2	100
8	17ISL78	Image processing Laboratory	IS	1:0:2:0	2	100
9	17ISP79	Project Phase-I and Seminar	IS	0:0:6:0	3	100
		Total		**18:0:12:8**	**26**	**900**

Foundation Elective-IX (IC)

Sl. No.	Course Code	Course
1	17ISI731	Soft Computing
2	17ISI732	Big Data
3	17ISI733	Web Technologies – Servlet, JSP

Engineering Elective-X / PBL

Sl. No.	Course Code	Course
1	17IST741	System Modeling and Simulation
2	17IST742	Machine Learning (NPTEL/MOOCS)
4	17IST743	Project Planning and Control (MOOCS)

Open Elective-XI

Sl. No.	Course Code	Course
1	17HOE751	Tax Management
2	17HOE752	Assessment of Building Energy Performance (Offered by ASHRAE)
3	17HOE753	National Disaster Management and Mitigation
4	17HOE754	Online certification courses from IITs/IISc/SWAYAM/EDX

Open Elective-XII

Sl. No.	Course Code	Course
1	17HOE761	Small and Medium Enterprise Management
2	17HOE762	Occupational Safety and Health Administration
3	17HOE763	Animation and Multimedia Engineering
4	17HOE764	Online certification courses from IITs / IISc / SWAYAM / EDX

Eighth Semester B.E. – Scheme

Sl. No.	Course Code	Course Name	Teaching Dept.	Total Credits	Marks
1	17ISP81	Project Phase-II	IS	4	100
2	17ISP82	Project Phase-III	IS	4	100
3	17ISP83	Evaluation and Viva-voce (External)	IS	10	100
		Total		**18**	**300**

IC – Integrated Course **L – Lecture** **T-Tutorials**
P-Practical **S – Self Study**

Choice Based Credit System (CBCS)

Outcome Based Education Curriculum

2019-2020

Department of Information Science and Engineering

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NAGARJUNA

COLLEGE OF ENGINEERING & TECHNOLOGY

An Autonomous College under VTU

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

VISION

To disseminate the IT knowledge among the students for achieving excellence in education and to irradiate budding engineers as leaders in information technology

MISSION

M1. To maintain leadership and excellence in Information Technology.

M2. Achieving excellence in IT through analysis, design, development of software products.

M3. Developing communication skills, leadership qualities and team work among students community by providing opportunities to work on various projects through internship with industry partners.

M4. To inculcate Ethics and Human values for solving societal problems and environmental protection.

M5. Promoting research, higher studies and entrepreneurship among the students through outside world interaction.

V & VIII Semesters

Scheme and Syllabus

With effect from Academic Year 2019-20

Fifth Semester B.E. – Scheme

Sl. No.	Course Code	Course	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17IST51	Computer Networks	IS	3:0:0:0	3	100
2	17IST52	Microcontrollers	IS	3:0:0:0	3	100
3	17ISI53	Operating System (IC)	IS	3:0:2:0	4	100
4	17IST54	SoftwareEngineeringandTesting	IS	3:0:0:0	3	100
5	17ISI55X	Foundation Elective-IV(IC)	IS	3:0:2:0	4	100
6	17IST56X	Engineering Elective-V	IS	3:0:0:0	3	100
7	17ISL57	Computer Networks Laboratory	IS	1:0:2:0	2	100
8	17ISL58	Microcontroller Laboratory	IS	1:0:2:0	2	100
9	17ISH59	General Aptitude	IS/BS&H	2:0:0:0	2	100
TOTAL				22:0:8:0	26	900

Foundation Elective-IV (IC)

Sl. No.	Course Code	Course
1	17ISI551	Advanced Algorithms
2	17ISI552	Object Oriented Programming with JAVA
3	17ISI553	Compiler Design(NPTEL/MOOCS)

Engineering Elective-V / PBL

Sl. No.	Course Code	Course
1	17IST561	Operations Research
2	17IST562	Object Oriented Modeling and Design
3	17IST563	Computer Architecture (MOOCS)/ Information Security (MOOCS)

Sixth Semester B.E. – Scheme

Sl. No.	Course Code	Course	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17IST61	Unix System programming	IS	3:0:0:0	3	100
2	17ISI62	Android Programming (IC)	IS	3:0:2:0	4	100
3	17IST63	Embedded System	IS	3:0:0:0	3	100
4	17ISI64X	Foundation Elective-VI (IC)	IS	3:0:2:0	4	100
5	17IST65X	Engineering Elective-VII	IS	3:0:0:0	3	100
6	17HOE66X	Open Elective-VIII	IS/BS&H	2:0:0:4	3	100
7	17ISL67	Unix System programming Laboratory	IS	1:0:2:0	2	100
8	17ISH68	Technical Aptitude and GD	IS/BS&H	2:0:0:0	2	100
9	17ISP69	Mini project and Seminar	IS	2:0:0:0	2	100
Total				22:0:6:4	26	900

Foundation Elective-VI (IC)

Sl. No.	Course Code	Course
1	17ISI641	Distributed Computing System
2	17ISI642	Database Concepts
3	17ISI643	Computer Graphics and Multimedia

Engineering Elective-VII /PBL

Sl. No.	Course Code	Course
1	17IST651	Data Mining
2	17IST652	Artificial Intelligence
3	17IST653	Introduction to CSS3 (MOOCS)

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	Teaching Dept.	L-T-P-S (Hrs/week)	Total Credits	Marks
1	17IST71	Internet of Things	IS	3:0:0:0	3	100
2	17IST72	Image Processing	IS	3:0:0:0	3	100
3	17ISI73X	Foundation Elective-IX (IC)	IS	3:0:2:0	4	100
4	17IST74X	Engineering Elective-X	IS	3:0:0:0	3	100
5	17HOE75X	Open Elective-XI	IS/BS&H/ME	2:0:0:4	3	100
6	17HOE76X	Open Elective-XII	IS/BS&H	2:0:0:4	3	100
7	17ISL77	Internet of Things Laboratory	IS	1:0:2:0	2	100
8	17ISL78	Image processing Laboratory	IS	1:0:2:0	2	100
9	17ISP79	Project Phase-I and Seminar	IS	0:0:6:0	3	100
		Total		**18:0:12:8**	**26**	**900**

Foundation Elective-IX (IC)

Sl. No.	Course Code	Course
1	17ISI731	Soft Computing
2	17ISI732	Big Data
3	17ISI733	Web Technologies – Servlet, JSP

Engineering Elective-X / PBL

Sl. No.	Course Code	Course
1	17IST741	System Modeling and Simulation
2	17IST742	Machine Learning (NPTEL/MOOCS)
4	17IST743	Project Planning and Control (MOOCS)

Open Elective-XI

Sl. No.	Course Code	Course
1	17HOE751	Tax Management
2	17HOE752	Assessment of Building Energy Performance (Offered by ASHRAE)
3	17HOE753	National Disaster Management and Mitigation
4	17HOE754	Online certification courses from IITs/IISc/SWAYAM/EDX

Open Elective-XII

Sl. No.	Course Code	Course
1	17HOE761	Small and Medium Enterprise Management
2	17HOE762	Occupational Safety and Health Administration
3	17HOE763	Animation and Multimedia Engineering
4	17HOE764	Online certification courses from IITs / IISc / SWAYAM / EDX

Eighth Semester B.E. – Scheme

Sl. No.	Course Code	Course Name	Teaching Dept.	Total Credits	Marks
1	17ISP81	Project Phase-II	IS	4	100
2	17ISP82	Project Phase-III	IS	4	100
3	17ISP83	Evaluation and Viva-voce (External)	IS	10	100
		Total		**18**	**300**

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

SCI LAB : 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, Shiftingrule, 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", (Chapters21 ,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, 9thEdition, 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

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	3	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. htt s://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. htt s://www.abebook.com/Digital_Principles_Applicati venth_Editi 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):

1. Development Environment • Eclipse (SpringSource Tool Suite distribution) • Apache Tomcat/VMware® vFabric™ tc Server • Spring Insight • Testing tools	**2. Spring Overview** • Introduction to Spring configuration • Bean life cycle • Simplifying configuration • Integration testing with Spring
3. Getting Started with Spring Web MVC • Spring model-view-controller (MVC) overview • DispatcherServlet • Controller programming model overview • Spring MVC views • Simplifying configuration	**4. Spring MVC Configuration Options** • Spring MVC infrastructure Beans • URL mappings • Handler interceptors and handler adapters • Exception resolvers • Message source

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

2. Java Script and jQuery

a. jQuery form validations:

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

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. Iftheuseentersincorrectvaluesappropriateerrormessageshouldbedisplayed and should allow the user to enter correct data

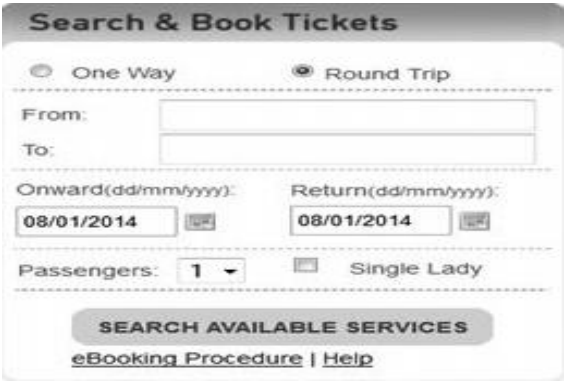
b. jQuery image slider :

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:



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.**

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 Book:

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. htt s://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 o f 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 it Attributes – tone, intensity, frequency, wavelength, pitch etc. Mono V/ S Stereo Sound, Sound Channels, Effects in Sound, Analog V/ S 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 :

Nagarjuna College of Engineering and Technology	
• NCET Courses	NCET is an autonomous body under VTU
• Syllabus	
• Duration	
• Examinations	
• Minimum Qualifications	
• New Batches	
• Feedbacks	

   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 Book:

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.
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	0:2:0:0	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

Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering. **02 Hours**

Course Outcomes:

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

- Familiarize with fundamental rights and duties.
- Recognize the Electoral Process.
- Get exposed to legislature and judiciary.
- Realize special provisions given for women, children and weaker section of society.
- Exhibit Engineering ethics and responsibilities of Engineers.

Text Books:

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

Reference Books:

1. M.V. Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002, 1st Edition, ISBN-13: 978-8125918325.
2. M. Govindarajan, S. Natarajan, V.S. Senthilkumar, "Engineering Ethics", PHI Learning Private Limited, New Delhi, 2nd Edition, 2013, ISBN-13: 978-8120348165.
3. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI Learning Private Limited, New Delhi, 7th 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 18ISM41	3:0:2	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:"HigherEngineeringMathemati ,(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-l1pf.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 OperationalConcepts, 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 OnlyMemories, Speed, Size, and Cost, Cache Memories – Mapping Functions,

Replacement Algorithms, Performance Considerations, Virtual Memories, Secondry 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, ZvonkoVranesic, SafwatZaky: "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.

7 Hours

Module - V

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

Exceptions, Interrupts and the Vector Table, Introduction to ARM Instruction Set: Data Processing Instructions Simple programming exercises. **09 Hours**

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 NSloss, 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=pandtbm=bksandq=inauthor:%22Douglas+V.+Hall%22
3. htt s://www.google.co.in/search?tbo=pandtbm=bksandq=inauthor:%22Dougla+V.+Hall%22#tbm=bksandq=Bary+b+brey
4. htt //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. htt s://www.google.co.in/search?tbo=pandtbm=bksandq=inauthor:%22Douglas+V.+Hall%22
7. https://www.google.co.in/search?tbo=pandtbm=bksandq=inauthor:%22Douglas+V.+Hall%22#tbm=bksandq=Bary+b+brey
8. 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 cloudmodel, serviceproviderspecificconsiderations, cloudadoptionphases, Financial and technical feasibility assessment, migration and optimization considerations.

8 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 toClasses and Objects, member functions and member data, objects and functions,objects and arrays, Namespaces, Nested classes, Constructors, Destructors. 8 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. **8 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. **8 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() andgetCodebase().Swings: The origins of Swing, Two key Swing features, Components and Containers, The Swing Packages, A simple Swing Application, Create a Swing Applet, JlabelandImageIcon, JTextField, The Swin gButtons,JTabbedpane,JScrollPane,JList,JComboBox,JTable. **8 hours**

Module – V

Event Handling andMulti-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. **8hours**

Laboratory

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

Course Outcomes

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

- Understand the basic concepts ofProcedure–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, 2, 3, 4, 5, 6, 8, 9,10, 11, 21, 22, 29, 30)

Reference Books:

1. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.
2. Mahesh Bhave 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), 5th Edition, Khanna Publishers, 2011, ISBN-13: 9788174090737.
2. John Twidell and Tony Weir: "Renewable Energy Resources", (Chapters 2,5-7,9-14), 3rd Edition, Routledge Publisher, 2015, ISBN-13: 978041558437.
3. N K Bansal: "Non-Conventional Energy Resources", (Chapters 1-3,9,10,12,13), 1st Edition, Vikas Publishing, 2014, ISBN-13: 978935978577.

Reference Books:

1. B H Khan: "Non-Conventional Energy Resources", (Chapters 4-10), 2nd Edition, Tata McGraw-Hill Pub., 2006, ISBN-13: 9780070142763.
2. S P Sukhatme, J K Nayak, "Solar Energy", (Chapters 3,4), 3rd 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	04:0:0:0	04	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to **:**

Understand the area of cyber security.

- To 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 Needfor 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 andthe Internet. Fundamentals of Electronic Commerce: Introduction, Foundations and applications of e-commerce, Business to Consumer and Business to Business com-merce, 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.
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.
- To 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 matrials.
- 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. RaoM.N. and RaoH.V.N:"Air Pollution",(Chapters 1-6),Tata- McGraw- Hill Publishing CompanyLtd.,New Delhi, India, 2011,ISBN 13:978-0074518717.
2. AnjaneyuluY:"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, 2nd Edition, 2013, ISBN- 13: 978-8122418354.

References Books:

1. Gilbert M Masters: "Introduction To Environmental Engineering and Science", (Chapters1-4), Pearson Education,3rd Edition,2007,ISBN-13:978-0131481930.
2. Mahajan.S.P:"Pollution Controlin ProcessIndustries",(Chapters1-5),Tata McGrawHillPublishing 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

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:

- 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.
- To 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 matrials.
- 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. RaoM.N. and RaoH.V.N:"Air Pollution",(Chapters 1-6),Tata- McGraw- Hill Publishing CompanyLtd.,New Delhi, India, 2011,ISBN 13:978-0074518717.
2. AnjaneyuluY:"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, 2nd Edition, 2013, ISBN- 13: 978-8122418354.

References Books:

1. Gilbert M Masters: "Introduction To Environmental Engineering and Science", (Chapters1-4), Pearson Education,3rd Edition,2007,ISBN-13:978-0131481930.
2. Mahajan.S.P:"Pollution Controlin ProcessIndustries",(Chapters1-5),Tata McGrawHillPublishing 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

Technical Report Writing And IRDP

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
I8CSD47	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 Books:

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
I8KAK38 / I8KVK38	1:0:0:0	1	CIE:50 SEE:50	1 Hours	S&H

ICourse Learning Objectives:

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

Table of Contents:

Chapter - 1:

Vyavaharika kannada – Parichaya (Introduction to Vyavaharika Kannada).

Chapter - 2:

Kannada Aksharamale haagu uchcharane (Kannada Alpabets and Pronunciation).

Chapter - 3:

Sambhashanegaagi Kannada Padagalu (Kannada Vocabulary for Communication).

Chapter - 4:

Kannada Grammar in Conversations (Sambhashaneyalli Kannada Vyakarana).

Chapter - 5:

Activities in Kannada.

Course Outcomes:

1. 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
I8KAK38 / I8KVK38	1:0:0:0	1	CIE:50 SEE:50	1 Hours	S&H

DqÀ½vÀ PÀ£ÀßqÀ PÀºPÉAiÀÄ GzÉÝÃ±ÀUÀ¼ÀÄ

- ¥ÀzÀ« «zÁåyð¼ÁVgÀÄªÀÅzÀjAzÀ DqÀ½vÀ PÀ£ÀßqÀzÀ ¥ÀjZÀAiÀÄ ªÀiÁrPÉÆqÀÄªÀÅzÀÄ.
- «zÁåyðUÀ¼À°è PÀ£ÀßqÀ ¨sÁµÉAiÀÄ ªÁåPÀgÀtzÀ §UÉÎ CjªÀÅ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- *PÀ£ÀßqÀ ¨sÁµÁ gÀZÀ£ÉAiÀÄºè£À ¤AiÀÄªÀÄUÀ¼À£ÀÄß ¥ÀjZÀ¬Ä¸ÀÄªÀÅzÀÄ.*
- *PÀ£ÀßqÀ ¨sÁµÁ §gÀºÀzÀ°è PÀAqÀÄ§gÀÄªÀ zÉÆÃµÀUÀ¼ÀÄ ºÁUÀÆ CªÀÅUÀ¼À ¤ªÁgÀuÉ ªÀÄvÀÄÛ ¯ÉÃR£À aºÉßUÀ¼À£ÀÄß ¥ÀjZÀ¬Ä¸ÀÄªÀÅzÀÄ.*
- ¸ÁªÀiÁ£Àå CfðUÀ¼ÀÄ, ¸ÀPÁðj ªÀÄvÀÄÛ CgÉ ¸ÀPÁðj ¥ÀvÀæ ªÀåªÀºÁgÀzÀ §UÉÎ CjªÀÅ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- ¨sÁµÁAvÀgÀ ªÀÄvÀÄÛ ¥Àæ§AzsÀ gÀZÀ£É §UÉÎ C¸ÀQÛ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁ¨sÁå¸À ªÀÄvÀÄÛ ¸ÁªÀiÁ£Àå PÀ£ÀßqÀ ºÁUÀÆ DqÀ½vÀ PÀ£ÀßqÀzÀ ¥ÀzÀUÀ¼À ¥ÀjZÀAiÀÄ ªÀiÁrPÉÆqÀÄªÀÅzÀÄ.

¥Àj«r (¥ÀoÀå¥ÀÄ¸ÀÛPÀzÀ°ègÀÄªÀ «µÀAiÀÄUÀ¼À ¥ÀnÖ)

CzsÁåAiÀÄ - 1

PÀ£ÀßqÀ¨sÁµÉ - ¸ÀAQë¥ÀÛ «ªÁgÀuÉ.

CzsÁåAiÀÄ - 2

¨sÁµÁ ¥ÀæAiÉÆÃUÀzÀ¯ÁèUÀÄªÀ ¯ÉÆÃ¥ÀzÉÆÃµÀUÀ¼ÀÄ ªÀÄvÀÄÛ CªÀÅUÀ¼À ¤ªÁgÀuÉ.

CzsÁåAiÀÄ - 3

¯ÉÃR£À aºÉßUÀ¼ÀÄ ªÀÄvÀÄÛ CªÀÅUÀ¼À G¥ÀAiÉÆÃUÀ.

CzsÁåAiÀÄ - 4

¥ÀvÀæ ªÀåªÀºÁgÀ.

CzsÁåAiÀÄ - 5

DqÀ½vÀ ¥ÀvÀæUÀ¼ÀÄ.

CzsÁåAiÀÄ - 6

¸ÀPÁðgÀzÀ D0zÉÃ±À ¥ÀvÀæUÀ¼ÀÄ.

CzsÁåAiÀÄ - 7

¸ÀAQë¥ÀÛ ¥Àæ§AzsÀ gÀZÀ£É (¦æ¸ÉÊ¸ï gÉÊnAUï), ¥Àæ§AzsÀ ªÀÄvÀÄÛ ¨sÁµÁAvÀgÀ.

CzsÁåAiÀÄ - 8

PÀ£ÀßqÀ ±À§Ý¸ÀAUÀæºÀ.

CzsÁåAiÀÄ - 9

PÀA¥ÀÆålgï ºÁUÀÆ ªÀiÁ»w vÀAvÀæeÁÕ£À.

CzsÁåAiÀÄ - 10

¥Áj¨sÁ¶PÀ DqÀ½vÀ PÀ£ÀßqÀ ¥ÀzÀUÀ¼ÀÄ ªÀÄvÀÄÛ vÁAwæPÀ / PÀA¥ÀÆålgï ¥Áj¨sÁ¶PÀ ¥ÀzÀUÀ¼ÀÄ.

DqÀ½vÀ PÀ£ÀßqÀ PÀºPÉAiÀÄ ¥sÀºvÁA±ÀÀUÀ¼ÀÄ

- DqÀ½vÀ ¨sÁµÉ PÀ£ÀßqÀzÀ ¥ÀjZÀAiÀÄªÁUÀÄvÀÛzÉ.
- «zÁåyðUÀ¼À°è PÀ£ÀßqÀ ¨sÁµÉAiÀÄ ªÁåPÀgÀtzÀ §UÉÎ CjªÀÅ ªÀÄÆqÀÄvÀÛzÉ.
- *PÀ£ÀßqÀ ¨sÁµÁ gÀZÀ£ÉAiÀÄ°è£À ¤AiÀÄªÀÄUÀ¼ÀÄ ªÀÄvÀÄÛ ¯ÉÃR£À aºÉßUÀ¼ÀÄ ¥ÀjZÀ¬Ä¸À®àqÀÄvÀÛªÉ.*
- ¸ÁªÀiÁ£ÀÅ CfðUÀ¼ÀÄ, ¸ÀPÁðj ªÀÄvÀÄÛ CgÉ ¸ÀPÁðj ¥ÀvÀæªÀåªÀºÁgÀzÀ §UÉÎ CjªÀÅ ªÀÄÆqÀÄvÀÛzÉ.
- ¨sÁµÁAvÀgÀ ªÀÄvÀÄÛ ¥Àæ§AzsÀ gÀZÀ£É §UÉÎ C¸ÀQÛ ªÀÄÆqÀÄvÀÛzÉ.
- PÀ£ÀßqÀ ¨sÁµÁ¨sÁå¸À ªÀÄvÀÄÛ ¸ÁªÀiÁ£ÀÅ PÀ£ÀßqÀ ºÁUÀÆ DqÀ½vÀ PÀ£ÀßqÀzÀ ¥ÀzÀUÀ¼ÀÄ *¥ÀjZÀ¬Ä¸À®àqÀÄvÀÛªÉ.*

¥ÀjÃPÉëAiÀÄ «zsÁ£À :

1. *¤gÀAvÀgÀ DAvÀjPÀ ªÀiË®åªÀiÁ¥À£À* - CIE (Continuous Internal Evaluation):
2. *PÁ¯ÉÃdÄ ªÀÄlÖzÀ°èAiÉÄ DAvÀjPÀ ¥ÀjÃPÉëAiÀÄ£ÀÄß 100 CAPÀUÀ½UÉ «±Àé«zÁå®AiÀÄzÀ ¤AiÀÄªÀÄUÀ¼ÀÄ ªÀÄvÀÄÛ ¤zÉðÃ±À£ÀzÀAvÉ £ÀqÉ¸ÀvÀPÀÌzÀÄÝ.*

¥ÀoÀå¥ÀÅ¸ÀÛPÀ :

1. DqÀ½vÀ PÀ£ÀßqÀ ¥ÀoÀå ¥ÀÄ¸ÀÛPÀ (Kannada for Administration), ¸ÀÀA¥ÁzÀPÀgÀÄ : qÁ.J¯ï. wªÉÄäÃ±À, ¥ÉÇæ. «. PÉÃ±ÀªÀªÀÄÆwð,

¥ÀæPÀluÉ :

1. *¥Àæ¸ÁgÁAUÀ, «±ÉéÃ±ÀégÀAiÀÄå vÁAwæPÀ «±Àé«zÁå®AiÀÄ, ¨É¼ÀUÁ«.*

Fifth Semester B.E. – Syllabus

Computer Networks

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST51	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Understand the basics concept of data communications.
- Understand OSI and TCP/IP models.
- Understand the functions 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 and Physical Layer: Data Communications, Networks, 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) **09 Hours**

Module – II

Switching and Data Link Layer-1: Introduction to switching, Datagram Networks, Virtual Circuit Networks, and Error Detection andCorrection: Introduction, Block coding, Cyclic codes, Checksum. **09 Hours**

Module – III

Data Link Layer-2: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy channels, HDLC, PPP (Framing, Transition phases only) Random access, Controlled Access, Channelization,Connecting devices. **08 Hours**

Module – IV

Network Layer: Logical addressing, IPv4 addresses, IPv6 addresses, IPv4 and IPv6 Headers, Routing in Packet networks, Shortest path routing: Bellman-Ford algorithm, Dijikstra's Algorithm, Overview of network security, secret key encryption protocol, public key encryption protocols. **08 Hours**

Module – V

Applications Layer and Network Management: 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 :

- Solve problems on shortest path routing algorithms.
- Analyse traffic management at different levels.
- Explain concepts of Cryptography algorithms.
- Analyse the various application layer protocols.
- Analyse different networks.

Text Books:

1. Behrouz A. Forouzan: "Data Communication and Networking", 5th Edition, Tata McGraw-Hill, July 2012, ISBN: 978-0-07-337622-6, (Chapters 1-4,8,11-13, Listed topics only).
2. Alberto Leon-Garcia, Indra Widjaja: "Communication Networks -Fundamental Concepts and Key architectures", 2nd Edition, Tata McGraw-Hill, 2004, reprint 207, ISBN-13: 978-0-07-059501-9, (Chapters 7, Listed topics only).
3. Nader F. Mir: "Computer and Communication Networks", 2nd Edition, Pearson Education, 2015, ISBN: 0133814742, (Chapters 9,10,19, Listed topics only).

Reference Books:

1. William Stallings: "Data and Computer Communication", 8th Edition, Pearson Education, 207, ISBN-13: 978-0133506488.
2. Larry L. Peterson and Bruce S. Davie: "Computer Networks – A Systems Approach", 4th Edition, Elsevier, 207, 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

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST52	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Understand controlled operations of embedded systems using processors/ microcontrollers.
- Understand the architecture of a microcontroller 8051.
- Understand the programming model and instruction set supported by the microcontroller.

Syllabus

Module – I

8085 Microprocessor architecture: 8085 Microprocessor Detailed functional block Diagram and Architecture, the 8085 Programming Model, Instruction, opcode and data format.

Microprocessors and Microcontroller: RISC and CISC CPU architectures, Harvard and Von Neuman CPU Architecture. **08 Hours**

Module – II

The 8051 architecture: Introduction, 8051 Microcontroller hardware, I/O pins, ports and circuits, external memory

8051 Addressing modes and operations: Introduction, Addressing modes, External Data moves, Code memory, read only data moves, Indexed addressing mode.

08 Hours

Module – III

PUSH and POP opcodes, Data exchanges, example programs. Logical operations introduction, Byte level, bit level logic operations, Rotate and Swap operation ,example programs, Arithmetic operation introduction, flags, incrementing and decrementing, addition subtraction, multiplication and division, Decimal arithmetic, Example programs. **08 Hours**

Module – IV

Jump and call operations: The JUMP and CALL program range, Jump calls and subroutine and returns, example programming

8051 programming in C: Data types and time delays in 8051C,I/O programming, Logic operations, Data conversion programs, Accessing code ROM and Data serialization

Timer/Counter programming in 8051: Programming 8051 timers Counter programming, Programming timer 0 and 1. **08 Hours**

Module – V

8051 Serial communication: Basics of serial communication, 8051 connections to Rs-232, 8051 serial communication programming.

Interrupt programming: 8051 interrupts, Programming Timer Interrupts, programming External hardware Interrupts, programming the serial communication interrupt, interrupt priority in 8051. **08 Hours**

Course Outcomes:

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

- Explain the architecture of microprocessor and its comparison with microcontroller.
- Explain complete architecture of microcontroller.
- Write assembly level programs for 8051 microcontroller.
- Develop a C code for microcontroller based system.
- Formulate interrupt programs with 8051 hardware and software interrupts.

Text Books:

1. Ramesh S Gaonkar: "Microprocessor Architecture, Programming and Applications with 8085", 6th Edition, (Chapter 2), Prentice Hall, 2013.
2. Kenneth J Ayala: "The 8051 Micro controller Architecture, Programming and application", 3rd Edition, (Chapters 3.1-3.3,5.1-5.5,6.1-6.3,7.1-7.6), Thomson Learning.
3. Muhammad Ali Mazidi Janice Gillispie Mazidi, Roolin D McKinlay: "The 8051 Micro Controller And embedded Systems - using assembly and C", 2nd Edition, (Chapters 9-11), Pearson Education, 2007.

Reference Book:

1. Michael Predko: "Programming and Customizing the 8051 Microcontroller", Mc-Graw Hill, 1999.

E-Resources:

1. https://en.wikibooks.org/Embedded-systems/8051-microcontroller
2. www.circuitstoday.com/ 8051-microcontroller
3. nptel.ac.in/courses/webcourse-contents/IIT-KANPUR/microcontrollers

Operating System (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI53	3:0:2:0	4	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: 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**

Laboratory

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 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 :

1. Explain the concepts of Operating System Structure, Operations and Services.
2. Design new techniques for Multithreaded Programming, Process Scheduling and Synchronization.
3. Apply the skills of deal lock prevention and avoidance.

4. Design and implement Memory management Algorithms.
5. Explain the concept of file systems.

Text Book:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: "Operating System Principles", Wiley India, (Chapters 1-12), 8th Edition, 2009, ISBN: 9781118063330.

Reference Books:

1. D.M Dhamdhere: "Operating systems - A concept based Approach", Tata McGraw- Hill, 2nd Edition, 2002. ISBN: 978–0–07–295769–3.
2. P.C.P. Bhatt: "Introduction to Operating Systems: Concepts and Practice", (Chapters: 1, 2, 3.1 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, 208. ISBN: 978-81-203-4836-3.
3. Harvey M Deital: "Operating systems", Pearson Education, 3rd 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
17IST54	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.
- This course will enable students to :describe 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. Software processes: models, process iteration, activities. **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 :

- Understand the real world applications with the aid of software engineering techniques along with professional ethics and responsibilities.
- Learn 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 Books:

1. Ian Sommerville: "Software Engineering", 8th Edition, (Chapters 2,3,5,6,17,22), Pearson Education, 207, ISBN-13: 978-0137035151.
2. Paul C. Jorgensen: "Software Testing, A Craftsman's Approach", 3rd Edition, (Chapters 1,2,5,6,7,9,10), Auerbach Publications, 208, ISBN: 9781439889510.

Reference Books:

1 Roger.S.Pressman: "Software Engineering - A Practitioners approach", 7th Edition, McGraw Hill, 207.
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. LoiseTamres: "Introducing Software Testing", Pearson Education, 2003.

E-Resources:

1. nptel.ac.in/courses/106101061
2. computingcareers.acm.org
3. www.tutorialspoint.com/software-engineering

Advanced Algorithms (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI551	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.
- 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. **08 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

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 – V

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

Laboratory

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

Text Books:

1. T. H Cormen, C E Leiserson, R L Rivest, C Stein: "Introduction to Algorithms", (Chapters 1,3,4,17,24-26,30-32), Prentice-Hall of India, 3rd 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", 2nd Edition, Universities press, 207, ISBN: 9788173716126.

E-Resources:

1. http://staff.ustc.edu.cn/~csli/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/~csli/graduate/algorithms/book6/chap18.htm
4. https://en.wikipedia.org/wiki/Category:Graph_algorithms
5. http://staff.ustc.edu.cn/~csli/graduate/algorithms/book6/chap18.htm
6. http://staff.ustc.edu.cn/~csli/graduate/algorithms/book6/chap33.htm
7. https://en.wikipedia.org/wiki/String_searching_algorithm

Object Oriented Programming with JAVA (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI552	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Understand the basic concepts of Java Technology and its features.
- Get a clear understanding of the OOPs concepts.
- Write 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 **12 Hours**

Module – II

Arrays and Strings: Defining of an Array, Initializing and accessing an Array, Multi-Dimensional Array, String / String Buffer / String Builder.

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. **11 Hours**

Module – III

Exception Handling: What is Exception, Types of Exception, Exception Hierarchy, Custom excpetions.

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. **03 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. **24 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 :

- Understand the basic concepts of Java Technology and its features.
- Get a clear understanding of the OOPs concepts.
- Write programs in Java.
- Effectively use data structures like Collections, Lists, etc.
- Write defensive programming using Exception Handling.

Text Books:

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

Reference Books:

1. Joshua Bloch: "Effective Java", Pearson Education, 2nd Edition, ISBN-10: 933257653X
2. Cay S. Horstmann: "Core Java - Vol. I - Fundamentals", Pearson Education, 10th Edition, ISBN-10: 9332582718.

Operations Research

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST561	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 Book:

1. Frederick S. Hillier and Gerald J. Lieberman: "Introduction to Operations Research: Concepts and Cases", 8th 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, 207.
2. Hamdy A Taha: "Operations Research: An Introduction", 8th Edition, Pearson Education, 2007, ISBN: 81-203-2235-5.
3. Richard Bronson, Govindasami Naadimuthu: "Operations Research", SCHAUM'S Outlines, 2nd Edition, Tata Mcgraw-Hill, ISBN-13:978-0-07-058400-6, ISBN-10: 0-07-058400-1.

Object Oriented Modeling and Design

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST562	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Introducing students to the concepts of object oriented approach to perform systems analysis and design
- Highlighting the importance and limitations of object-oriented analysis and design.
- Show how object oriented analysis and design is applied in development of software.
- Pointing out the importance of UML model through out the process of object oriented modeling and design.
- Providing students with 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. **07 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 opertoins. **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**

Object oriented modeling and design Lab

To develop a mini-project following the 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. Identity 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, students will be 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 number of modeling views.
- Analyze the role and function of each UML model in developing object-oriented software.
- Estimate System performance and construction of UML models and expressing the appropriate notation associated with each model.

Text Book:

1. Michael Blaha, James Rumbaugh: "Object-Oriented Modeling and Design with UML", 2nd Edition, Pearson Education, 2005, ISBN 10: 8131711064 ISBN 13: 97 88131711064

Reference Books:

1. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: :UML 2 Toolkit", Wiley- Dreamtech India, 2004, ISBN-10: 0471463612, ISBN-13: 9780471463610.
2. Grady Booch: "Object-Oriented Analysis and Design with Applications", 3rd Edition, Pearson Education, 2007, ISBN-10: 8131722872, ISBN-13: 9788131722879.

E- Resources:

1. http://www.tutorialspoint.com/object_oriented_analysis_design
2. https://www.slideshare.net/helghareeb/object-oriented-analysis-and-design
3. https://www.lynda.com/Java-tutorials/Understanding-object-oriented-analysis-design-processes/96949/106067-4.html

Computer Networks Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISL57	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: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. 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++:

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

3. 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.
4. Implement the above program using as message queues or FIFOs as IPC channels.
5. Write a program for simple RSA algorithm to encrypt and decrypt the data.
6. 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:

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

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

Microcontroller Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISL58	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Hands-on experience on the theoretical concepts through simple experiments

List of Experiments:

1. Perform the following,
   a. Add two multibyte number.
   b. Subtract two multibyte numbers.
2. Operations on the data block,
   a. Data block movement.
   b. Data block Exchange.
3. Perform the following,
   a. To find square of a given number.
   b. To find number of 1's and 0's in a given data.
4. Data conversion:
   Convert binary(hex) number to decimal equivalent.
5. To find the largest /smallest in an array,
6. To arrange the given array in ascending / descending order.
7. Counters:
   BCD up and down counter.
8. Write a program to show serial data transmission using 8051 microcontroller.
9. Interface DAC to 8051 chip to generate,
   a. Triangular waveform.
   b. Square wave

Course Outcomes:

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

- Demonstrate simple arithmetic and logical operations using 8051 MC.
- Generate waveforms using 8051 MC.
- Perform number conversion and counters using 8051 MC.
- Interface 8051 MC with motors.

Text Books:

1. Ramesh S Gaonkar: "Microprocessor Architecture, Programming and Applications with 8085", 6th Edition, Prentice Hall, 2013.
2. Kenneth J Ayala: "The 8051 Micro controller Architecture, Programming and application", 3rd Edition, Thomson Learning.
3. Muhammad Ali Mazidi Janice Gillispie Mazidi, Roolin D McKinlay: "The 8051 Micro Controller And embedded Systems - using assembly and C", 2nd Edition, Pearson Education, 2007.

Reference Book:

1. Michael Predko: "Programming and Customizing the 8051 Microcontroller", McGraw Hill, 1999.

E-Resources:

1. https://en.wikibooks.org/Embedded-systems/8051-microcontroller
2. www.circuitstoday.com/ 8051-microcontroller
3. nptel.ac.in/courses/webcourse-contents/IIT-KANPUR/microcontrollers

General Aptitude

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISH59	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.

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Sixth Semester B.E. – Syllabus

Unix System Programming

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST61	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Understand UNIX, ANSI and POSIX standards.
- Write various programs to manipulate files and their attributes.
- Understand process environment, process control and process relationship.
- Understand the concept of signal handling and daemon process and its characteristics.
- Analyze interposes communication concepts pipes, message queues, shared memory, semaphores.

Syllabus

Module – I

Introduction: UNIX and ANSI Standards: The ANSI C Standard, the ANSI/ISO C++ Standards, Difference between ANSI C and C++, the POSIX Standards, the POSIX.1 FIPS Standard, the X/Open Standards. UNIX and POSIX APIs: The POSIX APIs, API Common Characteristics, File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files. **08 Hours**

Module – II

UNIX files and UNIX file API's: UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links. General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. **08 Hours**

Module – III

UNIX Process and Control: The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs. **08 Hours**

Module – IV

Process relationship and Signals: Interpreter Files, system Function, Process Accounting, User identification, Process Times, Terminal Logins, Network Logins, Process Groups, Sessions, controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, Kill, Alarm. **08 Hours**

Module – V

Inter-Process Communication: Introduction, Pipes, popen, and pclose Functions, Coprocesses, FIFOs, Message Queues, and Semaphores, shared memory. Daemon Characteristics, Coding Rules, basics of socket programming. **08 Hours**

Course Outcomes:

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

- Analyze the different manifested constants to determine the system is POSIX conforming.
- Differentiate the ANCSI C and POSIX standard.
- Use API's to implement interposes communication and other basic services of UNIX kernel.
- Implement fork, race condition, zombie process etc.
- Apply system calls to create processes that manipulate system resources and get the system configuration limits.

Text Books:

1. Terrence Chan: "UNIX System Programming Using C++", Prentice Hall India, 1999, ISBN-10: 0133315622, (Listed topics only from Chapters 1,5-10).
2. W. Richard Stevens: 'Advanced Programming in the UNIX Environment", 2nd Edition, Pearson Education, 2005,ISBN: 0201433079.(Listed topics only from Chapters 7, 8, 9, 13, 14,15)

Reference Books:

1. Marc J. Rochkind: "Advanced UNIX Programming", 2nd Edition, Pearson Education, 2005.
2. Maurice J Bach: "The Design of the UNIX Operating System", Pearson Education, 1987.

E-Resources:

1. www.compsci.hunter.cuny.edu/~sweiss/course_materials/unix_lecture.../chapter_01.pdf
2. www.cs.northwestern.edu/~pdinda/netclass-f00/unix_nutshell.pdf
3. www.goodreads.com/author/show/1268629.Terrence_Chan
4. www.adamsenggcollege.ac.in/Unix%20System%20Programming%20NOTES%20b

Android Programming (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI62	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Describe the Android SDK features and the Development Framework and understanding Activities.
- 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.

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**.** **08 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 . **08 Hours**

Module- III

Using Image Views to Display Pictures - Gallery and Image View Views, Image Switcher, Grid View, Using Menus with Views - Creating the Helper Methods, Options Menu, Context Menu, Saving and Loading User Preferences - Using get Shared

Preferences(), Using get Preferences(), Persisting Data to Files - Saving to Internal Storage, Saving to External Storage (SD Card), Choosing the Best Storage Option, Using Static Resources, Creating and Using Databases. **08 Hours**

Module- IV

Sharing Data in Android, Using a Content Provider - Predefined Query String Constants, Projections, Filtering, Sorting, Creating Your Own Content Providers - Using the Content Provider. SMS Messaging - Sending SMS Messages Programmatically, Getting Feedback After Sending the Message, Sending SMS Messages Using Intent, Receiving SMS Messages, Updating an Activity from a Broadcast Receiver, Invoking an Activity from a Broadcast Receiver. **09 Hours**

Module- V

Creating Your Own Services - Performing Long-Running Tasks in a Service, Performing Repeated Tasks in a Service, Executing Asynchronous Tasks on, Separate Threads Using Intent Service, Communicating between a Service and an Activity, Binding Activities to Services. Preparing for Publishing, Versioning, Digitally Signing Your Android Applications, Deploying APK Files - Using the adb.exe Tool, Using a Web Server, Publishing on the Android Market, Creating a Developer Profile, Submitting Your Apps. **07 Hours**

List of Experiments

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 Text View Elements
5. Using An Options Menu
6. Create a Recycler View
7. Drawables, Themes and Styles
8. Create an AsyncTask
9. Connect to the Internet
10. Broadcast Receiver
11. Set and retrieve shared preferences
12. Implement a simple content provider

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 and views in Android.
- Create and use databases for Android Application.
- Implement messaging services in Android.
- Deploy mobile applications in various marketplace for distribution.

Text Books:

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

Reference Books:

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

E-Resources:

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

Embedded Systems

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST63	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Obtain a broad understanding of the embedded system technologies and applications of embedded systems
- Understand the communication buses for device networks of embedded systems.
- Have a basic knowledge on 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. **08 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. **08 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 Net5work 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 and software development tools.

Text Book:

1 Raj Kamal: “Embedded Systems: Architecture, Programming and Design”, Tata McGraw-Hill Education, 2011, ISBN: 070667640, ISBN-13: 978070667648.

Reference Book:

1. Shibu K V: “Introduction to Embedded Systems”, Tata McGraw Hill, 2009.

E-Resources:

1. https://books.google.co.in/books/about/Embedded_Systems.html?id=pWlbvW0H3IAC
2. https://www.abebooks.com/Embedded-Systems-Architecture-Programming-Design-Raj/4994588934

Distributed Computing System (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI641	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Learn Basic Concepts of DSM, Hardware DSM.
- Understand File Sharing, DFS Implementation, Replication in DFS,
- Understand the concepts of Cryptanalysis, Secure channels, Access control.
- Understand some of the security concepts in distributed computing.
- Understand the main ideas and concepts on web services.
- Study and work on a related topic of internet applications such as information hiding, system security and E-learning.
- Understand the concepts of UDDI, SOAP, JMS remote procedure calls.

Syllabus

Module – I

Distributed System Management: Introduction, Resource management, Task Assignment Approach, Load Balancing Approach, Load-Sharing Approach, Process management in a Distributed Environment, Process Migration, Threads,Fault Tolerance. **08 Hours**

Module – II

Distributed Shared Memory: Introduction, Basic Concepts of DSM, Hardware DSM, Design Issue in DSM Systems, Issue in Implementing DSM Systems, Heterogeneous and Other DSM Systems, Case Studies. **08 Hours**

Module – III

Distributed File System: Introduction to DFS, File Models, Distributed File System Design, Semantics of File Sharing, DFS Implementation, File Caching in DFS, Replication in DFS, Case studies. **Naming**: Introduction, Desirable features of a good naming system, Basic concepts, System-oriented names, Object-locating mechanisms, Issues in designing human-oriented names, Name caches, Naming and security, Case study: Domain name service. **08 Hours**

Module – IV

Security in distributed systems: Introduction, Cryptography, Secure channels, Access control, Security Management, Case studies. **08 Hours**

Module –V

Real-Time Distributed Operating Systems: Introduction, Design issues in real-time distributed systems, Realtime communication, Real-time scheduling, Case study: Real-time communication in MARS.

Emerging Trends indistributed Computing: Introduction to emerging trends, Grid Computing, SOA, Cloud computing, the future of emerging Trends. **08 Hours**

List of Experiments

Note: Use Use EJB 3.X or any equivalent tool to implement the following experiment:

1. Design and implement client server application using RMI (Remote Method Invocation) to invoke a service to calculate the income tax.
2. Design and implement EJB (Entity Java Beans) session bean business logic to calculate income tax and invoke the service using stub, i.e., client side proxy object.
3. Design and implement an EJB entity bean to persist the client submitted data into an enterprise information system.
4. Design and implement an offline database communication system using JMS (Java Message Service) to service the client request.
5. Design and implement the client code to call the Micro soft service like free s ervice from UDDI (Universal Description Discovery Protocol).
6. Design and implement business logic and bind it as service using SOAP (Simple Object Access Protocol), also implement client to call service.

Course Outcomes:

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

- Design and apply iterative and recursive algorithms.
- Design and implement optimization algorithms in specific applications.
- Design appropriate shared objects and concurrent objects for applications.
- Develop and debug RPC based client-Server programs in UNIX.
- Realize the partial implementation of UDDI, SOAP, JMS in Web applications.

Text Book:

1. Sunitha Mahajan, Seema Shah: “Distributing Computing”, Oxford University press, 2010, ISBN-10: 0198061862, ISBN-13: 9780198061861, (Chapters 7-12,14).

Reference Book:

1. A.D. Kshemkalyani, M. Singhal: “Distributed Computing: Principles, Algorithms, and Systems”, Cambridge University Press, March 2011, ISBN: 9780521189842.

E-Resources:

1. https://global.oup.com/academic/product/distributed-computing-9780198093480
2. https://www.abebooks.com/book-search/author/sunita-mahajan-and-seema-shah/

Database Concepts (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI642	3:0:2:0	4	CIE:50 SEE:50	N/A	FE

Course Objectives:

This course will enable 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, Schema less 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 / CallableStatments, ResultSet, 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.

24 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)", S Chand Publishing, 5th Edition, ISBN-10: 9385676342.
2. Kristina Chodorow: "MongoDB: The Definitive Guide", Shroff, 2nd Edition, ISBN-10: 9351102696.

Reference Books:

1. Raghu Ramakrishnan: "Database Management Systems" (Asia Higher Education Engineering/Computer Science), McGraw Hill Education, 3rd Edition; ISBN-10: 07123151X.
2. Kyle Banker, Peter Bakkum, Shaun Verch: "MongoDB in Action", Dreamtech Press, 2nd Edition, ISBN-10: 9351199355.

Computer Graphics and Multimedia (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI643	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Gain experience in interactive computer graphics using the OpenGL API.
- Perform 2D and 3D transformations and homogeneous co-ordinates.
- Enable students to acquire knowledge about Multimedia compression and animations.
- Learn Creation, Management and Transmission of Multimedia objects.

Syllabus

Module - I

Introduction: Applications of computer graphics; A graphics system:

Images: Physical and synthetic; Imaging Systems; The synthetic camera model; The programmer's Interface; Graphics architectures; Programmable Pipelines; Performance Characteristics. **08 Hours**

Module - II

Graphics Programming: The Sierpinski gasket, Programming two dimensional Applications, The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; **Input and Interaction:** Interaction; Input devices; Clients and Servers; Display Lists; Display Lists and Modeling; Programming Event Driven Input; Menus; Picking; **08 Hours**

Module - III

Geometric Objects and Transformations: Scalars, Points, and Vectors; Three-dimensional Primitives; Coordinate Systems and Frames; Modeling a Colored Cube; Affine Transformations; Rotation, Translation and Scaling; Geometric Objects and Transformations; Transformation in Homogeneous Coordinates; **08 Hours**

Module - IV

Introduction, Media and Data Streams, Audio Technology: Multimedia Elements; Multimedia Applications; Multimedia Systems Architecture; Evolving Technologies for Multimedia Systems; Defining Objects for Multimedia Systems; Multimedia Data Interface Standards; The need for Data Compression; Multimedia Databases. Media:

Perception Media, Representation Media, Presentation Media, Storage Media, Transmission Media, Information Exchange Media, Presentation Spaces and Values, and Presentation Dimensions; Key Properties of a Multimedia System: Discrete and Continuous Media, Independence Media, Computer Controlled Systems, Integration; Characterizing Data Streams: Asynchronous Transmission Mode, Synchronous Transmission Mode, Isochronous Transmission Mode; Characterizing Continuous Media Data Streams. **08 Hours**

Module - V

Data Compression-1: Storage Space; Coding Requirements; Source, Entropy, and Hybrid Coding; Basic Compression Techniques; JPEG: Image Preparation, Lossy Sequential DCT-based Mode, Expanded Lossy DCT based Mode, Lossless Mode, Hierarchical Mode. **07 Hours**

List of Experiments

1. Write a program to recursively subdivide a tetrahedron to from 3D Sierpinski gasket. The number of recursive steps is to be specified by the user.
2. Write a program to implement Liang-Barsky line clipping algorithm.
3. Write a program to draw a color cube and spin it using OpenGL transformation matrices.
4. Write a program to create a house like figure and rotate it about a given fixed point using OpenGL functions.
5. Write a program to implement the Cohen-Sutherland line-clipping algorithm. Make provision to specify the input line, window for clipping and view port for displaying the clipped image.
6. Write a program using SCILAB that accepts an image (color or gray) and compresses it using the block truncation coding.

Course Outcomes:

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

- Get the concepts of Graphics display devices, different types of graphics drawing algorithms.
- Get the concepts of Viewing, Curves and surfaces.
- Understand concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.

- Solve simple problems in the basic representation and handling of multimedia data (images, audio and animations).
- Design creative approach in application of multimedia devices, equipment and systems.

Text Books:

1. Edward Angel: "Interactive Computer Graphics A Top-Down Approach with OpenGL", 6th Edition, Pearson Education, 2008, ISBN-13: 978-0-13-254523-52, (Chapters 1, 2.1-2.8, 2.11,2.12,3.1-3.9).
2. Ralf Steinmetz, KlaraNarstedt: "Multimedia Fundamentals: Vol 1Media Coding and Content Processing", 2nd Edition, PHI, Indian Reprint 2008, ISBN: 9780132442435, (Chapters 1-3,7).

Reference Books:

1. Donald Hearn, Pauline Baker: "Computer Graphics- OpenGL Version", 4th Edition, Pearson Education, 2010.
2. F.S. Hill Jr.: "Computer Graphics Using OpenGL", 3rd Edition, PHI, 2009.
3. Prabhat K Andleigh, KiranThakrar: "Multimedia Systems Design", 1st Edition, PHI, 2007.

E- Resources:

1. http://www.tutorialspoint.com/computer_graphics.
2. https://www.tutorialspoint.com//multimedia
3. https://www.ddegjust.ac.in/studymaterial/mca-5.

Data Mining

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST651	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable 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.
- Analyze the accuracy of diverse classifiers and predictors.
- Identify the appropriate clustering techniques for the given data sets.
- Get familiarized 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 and 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 and Computing Distance (Measures of Similarity andDissimilarity), 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 andinformational 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**

Course Outcomes:

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

- Identify the data and various data reprocessing 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 Book:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: "Introduction to Data Mining", (Chapters 1,2.1-2.3,4.1,5.1-5.4,6.1-6.7,8.1-8.5,10.3-10.5), Pearson Education, 2005, ISBN: 032-132-1367.

Reference Books:

1. Jiawei Han, Micheline-Kamber: "Data Mining - Concepts and Techniques", (Chapters 10.3-10.5), 2nd Edition, Morgan Kaufmann Publisher, 2006, ISBN: 978-81-312-0535-8.
2. G. K. Gupta: "Introduction to Data Mining with Case Studies", 3rd Edition, PHI, New Delhi, 2009.

E- Resources:

1. www-users.cs.umn.edu/~kumar/dmbook.
2. www.cs.ccsu.edu/~markov/ccsu_courses/datamining-1.html.
3. https://www.pearson.com/us/higher...Introduction-to-Data-Mining/PGM93748.html

Artificial Intelligence

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST652	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Get introduced to various search methods.
- Become familiar various knowledge representation methods.
- Provide the Symbolic Reasoning Under Uncertainty and Statistical Reasoning.
- Get familiarized with various Game Playing techniques.
- Get introduced to natural language processing using predicate logic.

Syllabus

Module – I

Introduction: What is AI?: The AI Problems, The Underlying Assumption, What Is An AI Techniques, The Level Of The Model, Criteria For Success, Some General References, One Final Word.

Problems, State Space Search and Heuristic Search Techniques: Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics, And Issues In The Design Of Search Programs, Additional Problems. Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis. **08 Hours**

Module – II

Knowledge Representation and Logical Agents: Knowledge Representation Issues: Representations And Mappings, Approaches To Knowledge Representation.

Using Predicate Logic: Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Computable Functions And Predicates, Resolution. Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning. **08 Hours**

Module – III

Symbolic and Statictical Reasoning: Symbolic Reasoning Under Uncertainty: Introduction To Nonmonotonic Reasoning, Logics For Non-monotonic Reasoning. Statistical Reasoning: Probability And Bays' Theorem, Certainty Factors And Rule-Base Systems, Bayesian Networks, Dempster Shafer Theory, Fuzzy Logic. **08 Hours**

Module – IV

Game Playing: Overview, And Example Domain: Overview, MiniMax, Alpha-Beta Cut-off, Refinements, Iterative deepening, The Blocks World, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques. **08 Hours**

Module –V

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Semantic Analysis, Discourse And Pragmatic Processing, Spell Checking.

Connectionist Models: Introduction: Hopfield Network, Learning In Neural Network, Application Of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI And Symbolic AI. **08 Hours**

Course Outcomes:

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

- Describe and Understand various search methods.
- Differentiate various knowledge representation methods.
- Solve issues Symbolic Reasoning Under Uncertainty and Statistical Reasoning.
- Manage various Game Playing techniques.
- Design natural language processing using predicate logic.

Text Books:

1. Elaine Rich, Kevin Knight: "Artificial Intelligence", 2nd Edition, Tata Mcgraw-Hill, 2009, ISBN: 07087709, ID: 7749235760.
2. Stuart Russel, Peter Norvig: "Artificial Intelligence: A Modern Approach", PHI, ISBN-10: 0-13-604259-7, ISBN-13: 978-0-13-604259-4.

Reference Books:

1. Stuart Russel, Peter Novig: "AI – A Modern Approach", 2nd Edition, Pearson Education, 2007.
2. Deepak Khemani: "Artificial Intelligence", Tata Mc-Graw Hill Education, 2013.

List of Open Source Software/learning website:

1. http://www.journals.elsevier.com/artificial-intelligence/
2. https://www.technologyreview.com/s/534871/our-fear-of-artificial-intelligence/
3. http://www.sanfoundry.com/artificial-intelligence-mcqs-inductive-logic-unification-lifting-1/.

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 topic 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 South-east, 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, Shavasan) **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, Vrkshasana, 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".

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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, Triputa 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), Shankarabarana, 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.

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Dance (Bharatanatya)

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 Bharatanatya.
- Learn Practical demonstrations of Bharatanatya steps on Prarthane Namaskara and Shlokas.
- Learn the movements of head, neck, eyes, hands according to Bharatanatya steps.
- Learn the brisk movements in Bharatanatya with the help of ADAVUS.

Syllabus

Module – I

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

04 Hours

Module – II

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

03 Hours

Module – III

Practical exercises on Prarthane, Namaskara and Shloka, Vyayama Kriye for Bharatanatya (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 Bharatanatya style.
- Perform basic steps in Abhinaya.
- Recognise and perform different Adavus.

Reference Book:

1. "Bharatanatya 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:17HOE666) 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.

Unix System Programming Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISL67	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Have hands-on experience on the theoretical concepts through simple experiments.
- Use the different manifested constants to determine the system is POSIX conforming.
- Use API's to implement interposes communication and other basic services of UNIX kernel.
- Use system calls to create processes that manipulate system resources and get the system configuration limits.

Syllabus

List of Experiments for USP:

Design, develop, and execute the following programs,

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. Write a C/C++ program which demonstrates interprocess communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.
4. 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.
5. 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.
6. Write a C/C++ program to implement the **system** function.

7. Write a C/C++ program to set up a real-time clock interval timer using the **alarm** API.
8. C/C++ program to do the following using fork, create a child process, the child process prints its own process id and the id of its parents and then exit. Parent process waits for its child to finish and it prints its own id and its child process id and then exits.
9. C/C++ program that accepts valid filename as a command line argument and for each of the argument prints the type of the file.
10. C/C++ program uses access API to determine command line argument, whether a named file exists. If named file exist program will read data from the file. If named file does not exist, it will create and string "hello world" will be written to the named file.
11. C/C++ program that takes the file name as command line argument and modify the access, modification time stamp of the file.

Course Outcomes:

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

- Analyze the different manifested constants used to determine the system is configurations.
- Use API's to implement interposes communication and other basic services of UNIX kernel.
- Design programs to create processes that manipulate system resources and get the system configuration limits.
- Develop programs to lock the file and record.
- Demonstrate how to set up a real-time clock interval timer using the **alarm** API.

Text Books:

1. Terrence Chan: "UNIX System Programming Using C++", Prentice Hall India, 1999, ISBN-10: 0133315622, (Listed topics only from Chapters 1,5-10).
2. W. Richard Stevens: "Advanced Programming in the UNIX Environment", 2nd Edition, Pearson Education, 2005, ISBN: 0201433079, (Listed topics only from Chapters 7-9,13-15).

E-Resources:

1. www.compsci.hunter.cuny.edu/~sweiss/course_materials/unix_lecture.../chapter_01.pdf
2. www.cs.northwestern.edu/~pdinda/netclass-f00/unix_nutshell.pdf

Technical Aptitude and GD

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISH68	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)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST71	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Learn about Vision and Strategic Research and Innovation Directions 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.
- Get exposed to Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Syllabus

Module – I

IoTand 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 and 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.

M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities. **08 Hours**

Module – III

An IoT architecture outline, standards considerations, IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model. **08 Hours**

Module – IV

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

I**oT Applications for Value Creations:** Introduction, IoT applications for industry. **08 Hours**

Module – V

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. **08 Hours**

Course Outcomes:

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

- Understand the vision of IoT from a global context.
- Determine the Market perspective of IoT.
- Use of Devices, Gateways and Data Management in IoT.
- Build state of the art architecture in IoT.
- App IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Text Book:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle: "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014, ISBN: 978-0-12-407684-6.

Reference Books:

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

E-Resources:

1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. http://www.zettajs.org/
4. Contiki (Open source IoT operating system)
5. Arduino (open source IoT project)
6. IoT Toolkit (smart object API gateway service reference implementation)
7. Zetta (Based on Node.js, Zetta can create IoT servers that link to various devices and sensors)

Image Processing

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST72	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Obtain a broad understanding of image representation.
- Understand the enhance and filtering of image quality.
- Have a basic knowledge on image restoration.
- Know how segment the image.
- Learn about morphological operations on given image.

Syllabus

Module – I

Introduction to Image Processing: Digital Image Fundamentals Light, brightness adaption and discrimination, Human visual system, Image as a 2D data, Image representation Gray scale and Color images, Image sampling and quantization, Color Fundamentals, Color Models, Pseudo-color image processing. **06 Hours**

Module – II

Image Enhancement and Filtering: Image enhancement and filtering in spatial domain: Intensity transformation functions: Contrast stretching, Thresholding, Image negative, Log transformation, Power-low transformation, Intensity level slicing and Bit-plane slicing. Image histogram, Histogram equalization process. Fundamentals of spatial filtering, Correlation and convolution, Spatial filtering mask for low pass filtering (smoothing) and high pass filtering (sharpening). **10 Hours**

Module – III

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

Module – IV

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

Module –V

Morphological Image Processing: Basic morphological operations, Erosion, dilation, opening, closing, Structuring elements, Hit-or-Miss transform, Basic Morphological Algorithms: hole filling, connected components, thinning, skeletons, Reconstruction by erosion and dilation. **07 Hours**

Course Outcomes:

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

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

Text Book:

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

Reference Books:

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

E-Resources:

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

Soft Computing (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI731	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

This course will enable students to :

- Introduce the ideas of Soft Computing.
- Become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for internecine systems.
- Provide the mathematical background for fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- Familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
- Introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

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 Back propagation Network, Fuzzy – Back propagation, Fuzzy Logic Controlled Genetic Algorithms. **07 Hours**

List of Lab programs

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 :

- Describe basic idea of modern computing techniques which are useful for solving the non-linear and complex functions that may come across during dissertation/ research work.
- Differentiate conversant with artificial intelligent techniques.
- Solve issues involved in Fuzzy logic, Artificial Neural Network.
- Manage GA systems.
- Design hybrid systems which are used for solving different transportation problems.

Text Books:

1. S.N. Sivanandan, S.N. Deepa: "Principles of Soft Computing", Wiley India, 2007, ISBN-10: 81-265-1075-7.
2. Sinha N.K., Gupta M. M.: "Soft Computing and Intelligent Systems Theory and Applications", (Chapters 1-25), Academic Press, 2000, ISBN-10: 0126464901, ISBN-13: 9780126464900.
3. S. Rajasekaran, G.A. VijayalaksmiPai: "Neural Network, Fuzzy Logic, and Genetic Algorithms - Synthesis and Applications", 2005, Prentice Hall, (Chapters 1-15), Page 1-435, ISBN: 8120321863.

Reference Books:

1. Timothy J.Ross: "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. Davis E.Goldberg: "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran, G.A.V.Pai: "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson, R.Dobbins: "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

E-Resources:

1. https://books.google.co.in/books/about/PRINCIPLES_OF_SOFT_COMPUTING_With_CD.html?id=CXru
2. https://books.google.co.in › Computers › Intelligence (AI) and Semantics

Big Data (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI732	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: 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: 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**

Lab Experiments

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 old 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, students will be able to :

1. Describe big data, types, and benefits and used cases from selected business domains.
2. Explain NoSQL big data using data models.
3. Use various databases like Key value, documents, etc.
4. Explain Hadoop, perform map-reduce analytics using Hadoop.
5. 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. VigneshPrajapati: "Big data analytics with R and Hadoop", 2013, SPD, ISBN-13: 978-93-5110-410-0 (Chapters 1,2).

Reference Books:

1. Tom White: "Hadoop: The Definitive Guide", 3rd Edition, O'Reilley, 2012.
2. Lars George: "HBase: The Definitive Guide", O'Reilley, 2011.

E-Resources:

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

Web Technologies – Servlet, JSP (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISI733	3:0:2:0	4	CIE:50 SEE:50	N/A	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. **09 Hours**

Module – II

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

Session Management: Creating and 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. **32 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:

This course will enable students to :

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

Text Books:

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

Reference Books:

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

System Modeling and Simulation

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17IST741	3:0:0:0	3	100	3 Hours	EE

Course Objectives:

This course will enable students to :

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

Syllabus

Module – I

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

Module – II

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

Module – III

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

Module – IV

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

Module – V

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

Course Outcomes:

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

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

Text Book:

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

Reference Books:

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

E-Resources:

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

Tax Management

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

Course Objectives:

This course will enable students to :

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

Syllabus

Module – I

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

Module – II

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

Module – III

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

Module – IV

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

Module – V

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

Course Outcomes:

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

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

Reference Books:

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

Assessment of Building Energy Performance

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

Course Objectives:

This course will enable students to :

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

Syllabus

Module – I

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

Module – II

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

Module – III

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

Module – IV

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

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

08 Hours

Module – V

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

Course Outcomes:

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

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

Text Books:

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

Reference Books:

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

Natural Disaster Mitigation and Management

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

Course Objectives:

Students will be able

- Teach students about types of natural and environmental disasters.
- Help students to develop skills in various stages of disaster preparedness, mitigation and management.
- Teach the students 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 and Tornadoes , Cyclones, Floods and Droughts - Global Patterns - Mitigation and 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 successful completion of this course, students 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.
- Know the key roles of capacity building to face disaster among government bodies, institutions, NGO's, etc.
- Learn methodologies for disaster risk assessment with the help of latest tools like GPS, GIS, Remote sensing, information technologies, etc.

Text Books:

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

Reference Book:

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

E-Resources:

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

Small and Medium Enterprise Management

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

Course Objectives:

This course will enable students to :

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

Syllabus

Module – I

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

Module-II

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

Module-III

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

Module-IV

Business Plan: Developing effective business plan-meaning, benefits of business plan, Timing of the business plan, Length of the business plan, composition of the business plan or detailed project report. Institutional Support Mechanism: District Industries Centre, State Directorate of Industries, SIDBI, NSIC, SISI, KSFC, KIADB, TECSOK. **08 Hours**

Module-V

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

Course Outcomes:

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

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

Text Books:

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

Reference Book:

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

Occupational Safety and Health Administration

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

ourse 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 Organinization. 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
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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)
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6. Bhagawati, B. Basics of occupational safety and health. IOSR J Environ Sci Toxicol Food Technol. 2015;9:91–94.
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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/
2. https://www.bloopanimation.com/animation-for-beginners/
3. https://robots.thoughtbot.com/css-animation-for-beginners

Internet of Things Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISL77	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Provide the students with a hands-on experience on the theoretical concepts through simple experiments.
- Understand the architecture of IoT Toolkit.
- Understand the working of an HTTP- to-CoAPin IoT toolkit.
- Understand the application framework and working of Raspberry Pi.
- Understand overview of Zetta.

Syllabus

List of Lab programs

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:

Upon completion of the Lab, students will be able to

- Understand the architecture of IoT Toolkit.
- Determine the smart object API gateway service.
- Use IoT toolkit.
- Analyze application framework and embedded software agents.
- Use Raspberry Pi with your existing system components.

Image Processing Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISL78	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Obtain a broad understanding of image representation
- Understand enhance and filtering of image quality.
- Have a basic knowledge on image restoration.
- Know how to segment the image.
- Learn about morphological operations on given image.

Syllabus

List of Lab programs:

1. Write program to read and display digital image using SCILAB.
2. Write and execute image processing programs using point processing method.
3. Write and execute programs for image arithmetic operations.
4. Write and execute programs for image logical operations.
5. Write and execute program for geometric transformation of image.
6. Write programs for image restoration.
7. Write and execute programs to remove noise using spatial filters.
8. Write a program in SCILAB for edge detection using different edge detection mask.

Course Outcomes:

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

- Analyze image representation.
- Enhance and filtering of image quality.
- Design image restoration technique.
- Perform image segmentation technique.
- Analyze and detect edge and noise removal.

Text Book:

1. Rafael C. Gonzalez, Richard E. Woods: “Digital Image Processing”, 3rd Edition, Pearson Education, 2014, ISBN-10: 9332518467, ISBN-13: 9789332518469.

Reference Books:

1. S Jayaraman, S Esakkirajan, T Veerakumar: “Digital Image Processing”, Tata McGraw Hill Publication, 2015, ISBN-10: 070144796, ISBN-13: 978070144798.
2. S Sridhar: “Digital Image Processing”, Oxford University Press, ISBN-10: 0199459355, ISBN-13: 9780199459353.

Project Phase-I and Seminar

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17ISP79	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

Eight Semester B.E. – Syllabus

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

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Program Educational Objectives (PEOs)

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

PEO1	Pursue a successful career in the field of Information Science & Engineering or a related field utilizing his/her education and contribute to the profession as an excellent employee, or as an entrepreneur.
PEO2	Be able to work effectively in multidisciplinary environments and be responsible members/leaders of their communities.
PEO3	The graduates of Information Science and Engineering Program should be able to establish an understanding of professionalism, teamwork, ethics, public policy that allows them to become good professional Engineers.
PEO4	The graduates of Information Science and Engineering Program should be able to provide novel engineering solutions and efficient software designs with legal and ethical responsibility.
PEO5	Continuously improve by pursuing advanced degrees in engineering, business, or other professional fields through formal means or through informal self-study.

Program Outcomes (POs)

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and information science and engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex information science and engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/ Development of solutions:** Design solutions for complex information 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.

PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern information science and engineering and IT tools including prediction and modeling to complex 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 information science and engineering practice.
PO7	**Environment and Sustainability:** Understand the impact of the professional information 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 information 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 engineering activities with the information science and 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 information science and engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage 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 information science and technological change.