K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

SCHOOL OF ENGINEERING & TECHNOLOGY

Bachelor of Computer Application

(BCA)

Programme Code: 06

2019-22

Approved in the 20th

Meeting of Academic

Council Held on 16

July 2019-22

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About K.R Mangalam University

The K.R. Mangalam Group has made a name for itself in the field of education. The K.R. Mangalam story goes back to the chain of schools that offered an alternative option of world-class education, pitching itself against the established elite schools, which had enjoyed a position of monopoly till then. Having blazed a new trail in school education, the focus of the group was aimed at higher education.

K.R. Mangalam University is the fastest-growing higher education institute in Gurugram, India. K. R. Mangalam University was established under the Haryana Private University Act 2006, received the approval of Haryana Legislature vide Amendment Act # 36 of 2013 and consent of the Hon'ble Governor of Haryana on 11th April 2013, which was published in the Gazette notification vide Leg. No.10/2013, dated 3rd May 2013.

Since its inception in 2013, the University has been striving to fulfil its prime objective of transforming young lives through ground-breaking pedagogy, global collaborations, and world-class infrastructure. Resources at K.R Mangalam University have been continuously upgraded to optimize opportunities for the students. Our students are groomed in a truly interdisciplinary environment where they grow up with integrative skills through interaction with students from engineering, social sciences, management and other study streams.

K.R Mangalam University is unique because of its:

1. Enduring legacy of providing education to high achievers who demonstrate leadership in diverse fields.
2. Protective and nurturing environment for teaching, research, creativity, scholarship, social and economic justice.

Objectives

i. To impart undergraduate, post graduate and doctoral education in identified areas of higher education.
ii. To undertake research programmes with industrial interface.
iii. To integrate its growth with the global needs and expectations of the major stake holders through teaching, research, exchange & collaborative programmes with foreign, Indian Universities/Institutions and MNCs.
iv. To act as a nodal center for transfer of technology to the industry.
v. To provide job oriented professional education to the Indian student community with particular focus on Haryana.

About School of Engineering & Technology (SOET)

School of Engineering and Technology (SOET), K.R. Mangalam University is dedicated to fostering innovation, excellence, and advancement in engineering and technology. Empowering the new generation of change-makers by imparting exceptional understanding and intellect to facilitate the creation of highly sophisticated futuristic solutions. Our well-qualified academicians, accomplished researchers and industry insiders are focused on imparting their extensive knowledge and expertise to students through various lectures, workshops, industrial visits, projects, and competitions throughout the year ensuring that students receive a comprehensive education that blends theory with practical application.

These programs offered at SOET have the distinct objective of equipping the students with knowledge, skills and attitudes in engineering and technology, to make them capable of successfully meeting the present requirements and future challenges in the engineering profession. SOET brings together outstanding academics, industry professionals, and experienced researchers to deliver a unique hands-on and multi-disciplinary learning experience.

The curriculum of programs has been designed to cater to the ever changing needs and demands of the industry. The curriculum is regularly updated. The school has best infrastructure including domain-specific labs. SOET aims to provide exposure to the principles and practices of Design / Developments and Projects in the area of engineering. SOET is offering Ph.D programs also.

School Vision
To create, disseminate, and apply knowledge in science and technology to meet the higher education needs of India and the global society, To serve as an institutional model of excellence in scientific and technical education characterized by integration of teaching, research and innovation.

School Mission

M1: To create an environment where teaching and learning are prioritized, with all support activities being held accountable for their success.

M2: To strengthen the institution's position as the school of choice for students across the State & Nation.

M3: To promote creative, immersive, and lifelong learning skills while addressing societal concerns.

M4: To promote co- and extra-curricular activities for overall personality development of the students.

M5: To promote and undertake all-inclusive research and development activities.

M6: To instill in learners an entrepreneurial mindset and principles.

M7: Enhance industrial, institutional, national, and international partnerships for symbiotic relationships.

M8: To help students acquire and develop knowledge, skills and leadership qualities of the 21st Century and beyond.

Programmes offered by the School

School offers undergraduate B. Tech Program, B.Sc. (Hons) Program, postgraduate M. Tech Program, and Doctoral Program. All these programs are designed to impart scientific knowledge to the students and provide theoretical and practical training in their respective fields.

Bachelor of Computer Applications (BCA)

This Program is aimed at developing a sound knowledge and understanding of concepts in key areas of Computer Science, Industrial Computing, Analysis and Synthesis involved in Computer Systems, Information Systems and Computer Applications, etc.An initiative to make the teaching-learning framework better and enhance the student learning outcomes, SOET has taken a thoughtful step by introducing the concept of Choice Based Credits System (CBCS) system.

Program Duration: - 3 Years (6 Semesters)

Eligibility Criteria: - The student should have passed the 10+2 examination conducted by the Central Board of Secondary Education or equivalent examination from a recognized Board with Mathematics/Computer Science/Informatics Practice/ on as one of the subjects and with an overall minimum aggregate of 50% or more.

Career Options

For BCA: IT Sector requiring Application Developments, Software Testing and Maintenance, PSUs,
Academics, Defense & Civil Services.

Class Timings

The classes will be held from Monday to Friday from 9.10 am to 4.10 pm.

Scheme of Studies and Syllabi

For BCA program scheme attached in Annexure A1. The syllabi is given in the following pages. These are arranged as: (a) common course (b) degree specific course, in numeric order of the last three digits of the course code.

For each course, the first line contains; Course Code, Tittle and Credits (C) of the course. This is followed by detailed syllabi.

Three Years Bachelor of Computer Application (BCA) Programme at a Glance

Semester	1	2	3	4	5	6	Total
Courses	8	8	9	9	10	8	**52**
Credits	26	25	24	25	24	26	**150**

Scheme of Studies as per Choice Based Credit System (CBCS)

BCA				Year 2019-2022 (Scheme of Studies)				SOET
				ODD SEMESTER				
Year	**SNo**		**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
First	1	SE	ETMC121A	Management Thoughts and Applications	3	-	-	3
	2	CC	ETCA131A	Introduction to Computers & IT, Office Automation	3	1	-	4
	3	CC	ETCS103A	Programming for Problem Solving	3	1	-	4
	4	SE	ETMA163A	Basics of Mathematics	3	1	-	4
	5	SE	ETCH 125A	Environmental Studies	3	-	-	3
	6	SE	ETCA161A	Introduction to Computers & IT, Office Automation Lab	-	-	2	1
	7	SE	ETCS153A	Programming for Problem Solving Lab	-	-	2	1
	8	SE		Open Elective - I	6	-	-	6
				TOTAL	**21**	**3**	**4**	**26**

				EVEN SEMESTER				
	SNo		**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
	1	SE	ETEL 101A	Communication Skills	4	-	-	4
	2	CC	ETCS112A	Object Oriented Programming	3	1	-	4

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	SNo		Course Code	Course Title	L	T	P	C
	3	CC	ETCS316A	Web Technologies	3	1	-	4
	4	SE	ETMA144A	Differential Equations & Optimization Techniques	3	1	-	4
	5	CC	ETCA 164A	Web Technologies Lab	-	-	2	1
	6	CC	ETCS166A	Object Oriented Programming Lab	-	-	2	1
	7	SE	ETEL 171A	Communication Skills Lab	-	-	2	1
	8	SE		Open Elective - II	**6**	**-**	**-**	**6**
		TOTAL			**19**	**3**	**6**	**25**

	SNo		Course Code	Course Title	L	T	P	C
Second	1	CC	ETCS217A	Data Structures	3	1	-	4
	2	SE	ETEC210A	Digital Electronics	3	1	-	4
	3	CC	ETCS219A	Foundation of Computer Systems	3	1	-	4
	4	CC	ETCS 211A	Operating Systems	3	1	-	4
	5	CC	ETCS323A	Java Programming	3	1	-	4
	6	SE	ETCS 257A	Data Structures Lab	-	-	2	1
	7	SE	ETEC 256A	Digital Electronics Lab	-	-	2	1
	8	CC	ETCS361A	Java Programming Lab	-	-	2	1
	9	SE	ETCA268A	Seminar	-	-	2	1
				TOTAL	**15**	**5**	**8**	**24**

Note: Practical training will be of six weeks duration at the end of fourth Semester during summer break and the evaluation will be done during fifth Semester.

	1	CC	ETCS222A	Computer Organization & Architecture	3	1	-	4
	2	CC	ETCS307A	Database Management Systems	3	1	-	4
	3	CC	ETCA326A	Enterprise Computing in JAVA	3	1	-	4

				Subject				
4	SE	SMMC123A	Business Applications Of Economics	3	-	-	3
5	CC	ETCA228A	Mobile Application Development	3	1	-	4
6	SE	ETCA366A	Enterprise Computing in JAVA Lab	-	-	2	1
7	SE	ETCS 355A	Database Management Systems Lab	-	-	2	1
8	SE	ETCA264A	Mobile Application Development Lab	-	-	2	1
9	SE	ETDM301A	Disaster Management	3	-	-	3
			TOTAL	18	4	6	25
Third	1	CC	ETCS306A	Data Warehousing and Data Mining	3	1	-	4
	2	CC	ETCA227A	Web Based Programming using PHP	3	1	-	4
	3	CC	ETCA325A	Linux Environment	3	1	-	4
	4	CC	ETCS304A	Computer Networks	3	1		4
	5	CC	ETCS214A	Theory of Computation	3	1	-	4
	6	SE	ETCA267A	Web Based Programming Using PHP Lab	-	-	2	1
	7	SE	ETCS362A	Data Warehousing and Data Mining Lab	-	-	2	1
	8	SE	ETCA365A	Linux Environment Lab	-	-	2	1
	9	SE	ETCA367A	Practical Training	-	-	2	1
			TOTAL	15	5	8	24
	1	CC	ETCS314A	Mobile Computing	3	1	-	4
	2	CC	ETCA324A	Net Framework	3	1	-	4
	3	CC	ETCS 202A	Software Engineering	3	1	-	4
	4	CC	ETCS422A	Cloud Computing	3	1	-	4
	5	SE	ETCA364A	Net Framework Lab	-	-	2	1

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6	SE	ETCA362A	Cloud Computing Lab	-	-	2	1
7	SE	ETCA368A	Major Project	-	-	6	3
8			**Elective (with Lab)**				
(i)	CC	ETCA328A	Multimedia Technologies	3	1	-	4
	SE	ETCA370A	Multimedia Technologies Lab	-	-	2	1
(ii)	CC	ETCA 330A	Network Security & Cryptography	3	1	-	4
	SE	ETCA372A	Network Security & Cryptography Lab	-	-	2	1
(iii)	CC	ETCA 332A	Software Testing	3	1	-	4
	SE	ETCA374A	Software Testing Lab	-	-	2	1
			TOTAL	15	5	12	26
		Total Credits [C]			**150**		

Abbreviations:

CC: Core Course

SE: Skill Enhancement

OE: Open Elective

ETCA 131A INTRODUCTION TO COMPUTERS & IT, OFFICE

AUTOMATION   (Credits-4)

UNIT – I

Introduction to Computers: The evolution of computers: Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers, Distributed Computer System, Parallel Computers. Computer Hardware: Major Components of a digital computer, Block Diagram of a computer Input devices, Output Device. Computer Memory: Memory Cell, Overview of Memory Organization, Primary Memory: RAM & ROM, Secondary memory: Magnetic tapes, Magnetic disk, CD-ROM, DVD.

UNIT – II

Introduction to System Software and Operating System: Computer Software: Machine language, assembly language, high-level languages, fourth generation language, assemblers, compilers, interpreters, linkers, loaders. Operating System concepts: different types of operating systems, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, timesharing, real time, single user & multi-user operating system.

UNIT – III

Programming Concepts & Techniques: Algorithms, flow chart, decision tables, pseudo code, characteristics of a good programming language, are planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation. Structured programming concepts, Programming methodologies viz. top-down and bottom up programming, Advantages and disadvantages of Structured programming.

UNIT – IV

Computer Networks & The Internet: Basic elements of a communication system, Data transmission modes, Data transmission media, Network topologies, Network Types (LAN, WAN and MAN), Client and Servers, Intranet, Extranet. Internet: Terminology related to Internet: Protocols, TCP/IP, HTTP, Internet addressing, Domain Names, DNS, URL, World Wide Web. Overview of various services on Internet: Webservers, E- mail, FTP, Telnet.

TEXTBOOKS

1. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications.
2. Anita Goel "Computer Fundamentals", Pearson. REFERENCE BOOKS 1. B.Ram Computer fundamentals Architecture and Organization, New Age Intl.

REFERENCE BOOKS

1. B.Ram Computer fundamentals Architecture and Organization,New Age Intl.
2. 2. Alex Leon & Mathews Leon, ―Introduction to Computers‖, Vikas Publishing.
3. Norton Peter, ―Introduction to computers‖, TMH.
4. Vikas Gupta, ―Comdex Computer Kit‖, Wiley Dreamtech, Delhi.

ETCS103A PROGRAMMING FOR PROBLEM SOLVING
(Credits-4)

UNIT I

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm:

Flowchart / Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- Arithmetic expressions and precedence

UNIT II

Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops. Arrays: Arrays (1-D, 2-D), Character arrays and Strings

UNIT III

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.
Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function, Quick sort or Merge sort.

UNIT IV

Structure: Structures, Defining structures and Array of Structures

Pointers: Idea of pointers, defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Suggested Textbooks

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

ETMA163A   BASICS OF MATHEMATICS (Credits-4)

UNIT I Determinants: Definition, Minors, Co-factors, Properties of Determinants, Applications of determinants in finding area of triangle. Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Solution of system of linear equation by Cramer's Rule.

UNIT II Sequence and Series: Introduction, Sequences, Series, Arithmetic Progression (A.P), Geometric Progression (G.P), Relationship Between A. M. and G.M., Sum to N terms of Special Series, Principle of Mathematical Induction.

UNIT III Differentiation: Derivative of a function, Derivatives of sum, differences, product, and quotient of functions, Derivative of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Derivatives of functions in parametric forms, Differentiation by substitution.

UNIT IV Integration: Indefinite integrals, Methods of integration: by substitution, by parts, by partial fractions, Integration of algebraic and transcendental functions.

TEXTBOOKS:
1. A Textbook of Mathematics for XI-XII Students, NCERT Publication Vol. I-II.
2. Shanti Narayan, Integral calculus, Sultan Chand & Co.
3. Shanti Narayan, Differential calculus, Sultan Chand & Company.
4. Babu Ram, Engineering Mathematics, Pearson Education.

ETCH 125A   ENVIRONMENTAL STUDIES   (Credits-3)

UNIT I

Introduction of Environmental Studies: Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.

Natural Resources: Renewable and Non-renewable Resources

Land resources: land use change; Land degradation, soil erosion and desertification.

Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.

Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).

Energy resources: Renewable and non- renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

UNIT II

Ecosystems: Definition and Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.
Case studies of the following ecosystems:

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biological Diversity: Levels of biological diversity; genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots; India as a mega- biodiversity nation; Endangered and endemic species of India; Threats to biodiversity. Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity; Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

UNIT III

Environmental Pollution: Types, causes, effects and controls; Air, water, soil and noise pollution. Nuclear hazards and human health risks; Solid waste management: Control measures of urban and industrial waste; Pollution case studies.

Environmental Policies and practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.

Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context. International agreements: Montreal &Koyoto protocol and convention on biological diversity. Nature reserves, tribal population and rights, human wildlife conflicts in Indian context.

UNIT IV

Human Communities and the Environment: Human population growth: Impacts on environment, human health and welfare; Resettlement and rehabilitation of project affected persons; case studies; **Disaster management:** floods, earthquake, cyclones and landslides; Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan; Environmental ethics: Role of Indian and other religions and cultures in environmental conservation; Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Field work:

Visit to an area to document environmental assets: river/
forest/ flora/fauna, etc. Visit to a local polluted site-
Urban/Rural/Industrial/Agricultural.
Study of common plants, insects, birds and basic
principles of identification. Study of simple ecosystems-
pond, river, Delhi Ridge, etc.

TEXTBOOKS:

1. ErachBharucha, Textbook of Environmental Studies, Universities Press (P) Ltd., Hyderabad, India.
2. Anubha Kaushik and C. P. Kaushik, Environmental Studies, New Age International Publishers (P) Ltd. New Delhi.

REFERENCE BOOKS:

1. A.K. De, Environmental Chemistry, New Age International Publishers (P) Ltd. New Delhi.
2. P. H. Raven, D. M. Hassenzahl& L. R. Berg, Environment, John Wiley & Sons, New Delhi.
3. J. S. Singh, S. P. Singh and S. R. Gupta, Ecology, Environmental Science and Conservation, S. Chand Publication, New Delhi.

ETCA161 INTRODUCTION TO COMPUTERS & IT, OFFICE AUTOMATION LAB   (Credits-1)

LIST OF EXPERIMENTS

1. MS-Windows: Operating system-Definition & functions, basics of Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance. Using windows accessories.

2. Documentation Using MS-Word - Introduction to Office Automation, Creating & Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advance Features of MS-WordMail Merge, Macros, Tables, File Management, Printing, Styles, linking and embedding object, Template.

3. Electronic Spread Sheet using MS-Excel - Introduction to MS-Excel, Creating & Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Advance features of MS- Excel-Pivot table & Pivot Chart, Linking and Consolidation, Database Management using Excel- Sorting, Filtering, Table, Validation, Goal Seek, Scenario.

4. Presentation using MS-PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In- Built Sound Effect.

ETCS153A   PROGRAMMING FOR PROBLEM SOLVING LAB (Credits-1)

LIST OF EXPERIMENTS

Lab1: Familiarization with programming environment

Lab 2: Simple computational problems using arithmetic expressions

Lab 3: Problems involving if-then-else
structures

Lab 4: Iterative problems e.g., sum of series

Lab 5: 1D Array manipulation

Lab 6: Matrix problems, String operations

Lab 7: Simple functions

Lab 8 and 9: Programming for solving Numerical methods problems

Lab 10: Recursive functions
Lab 11: Pointers and structures
Lab 12: File operations

ETEL101A   COMMUNICATIONSKILLS   (Credits-4)

UNIT I

Introduction to Communication: Meaning, Forms & Types of Communication; Process of Communication; Principles of Effective Communication/7Cs, Barriers in Communication; Literature: A Bird Came Down the Walk by Emily Dickinson

UNIT II
Essentials of Grammar: Parts of Speech: Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection; Using tenses; Articles; Types of sentences; Reported Speech; Punctuation; Literature: Stopping by Woods on A Snowy Evening by Robert Frost

UNIT III
Building Vocabulary: Word Formation (by adding suffixes and prefixes); Common Errors; Words Often Confused; One word substitution, Homonyms and Homophones; Antonyms &Synonyms, Phrasal Verbs, Idioms & Proverbs (25 each); Commonly used foreign words(15 in number); Liter-ature: The Gift of Magi by O'Henry

UNIT IV
Personality Development: Etiquette & Manners; Leadership; Inter & intrapersonal skills;

Attitude, Self-esteem & Self-reliance; Public Speaking; Body Language: Posture, Gesture, Eye Contact, Facial Expressions; Presentation Skills/ Techniques; Literature: My Prayer to Thee by Rabindranath Tagore;

TEXTBOOK:
Kumar, Sanjay and Pushplata. Communication Skills. Oxford University Press.
REFERENCE BOOKS / SITES:

1. Tickoo, M.L, Subramanian A. E. and Subramaniam P.R. Intermediate Grammar, Usage and Composition. Orient Blackswan.
2. Mitra, Barun K. Personality Development and Soft Skills. Oxford University Press.
3. "Best Poems", http://100.best-poems.net/. 20 July 2016.
4. "Classic English Short Stories", http://www.eastoftheweb.com/short-stories/Collections/ ClasEngl.shtml, 20 July 2016.

ETCS112A   OBJECT ORIENTED PROGRAMMING

(Credits-4)

UNIT I
Introduction: Introducing Object-Oriented Approach related to other paradigms (functional, data decomposition), Characteristics of Object-Oriented Languages.
Basic terms and ideas: Abstraction, Encapsulation, Information hiding, Inheritance, Polymorphism, Review of C, Difference between C and C++, Cin, Cout, new, delete operators.

UNIT II
Classes and Objects: Abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behavior of an object, Constructors and destructors, instantiation of objects, Default parameter value, Copy Constructor, Static Class Data, Constant Classes, C++ garbage collection, dynamic memory allocation.

UNIT III
Inheritance and Polymorphism: Inheritance, Types of Inheritance, Class hierarchy, derivation – public, private & protected, Agrégations, composition vs classification hiérarchies, Polymorphism, Type of Polymorphism – Compile time and runtime, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric polymorphism, Generic function – template function, function name overloading, Overriding inheritance methods

UNIT IV
Files and Exception Handling: Persistent objects, Streams and files, Namespaces, Exception handling, Generic Classes Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterates, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

TEXTBOOKS:
1. A.R. Venugopal, Rajjkumar, T. Ravishanker "Mastering C++", TMH
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications
3. Schildt Herbert, "C++ Programming", 2nd Edition, Wiley DreamTech.

REFERENCE BOOKS:
1. D. Parasons, ―Object Oriented Programming with C++‖, BPB Publication
2. Steven C. Lawlor, ―The Art of Programming Computer Science with C++‖, Vikas Publication
3. Yashwant Kanethkar, ―Object Oriented Programming using C++‖, BPB

ETCS308A   WEB TECHNOLOGIES   (Credits 3)

UNIT I

Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of Web 2.0, Common terminology: IP Addressing, URLs, Domain names. Website Creation and maintenance, Web Hosting and Publishing Concepts, Search Engines and their working.HTML: Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and sound, lists: types of lists, tables, frames and floating frames, Developing Forms, Image maps, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets.

UNIT II

Client-side scripting: JavaScript - Data Types, Control Statements, operators, Built-in and User Defined Functions, Objects in JavaScript, Handling Events. HTML Document Object Model. Page Styling: Separation of content and presentation in HTML, Cascading Style Sheets - Types of Style Sheets – Internal, inline and External style sheets, customizing common HTML elements, types of CSS selectors.

UNIT III

Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation, Browser architecture and Web site structure.

UNIT IV

XML: Introduction to XML-Mark up languages, Features of Mark-up languages, XML Naming rules, building block of XML, Document, Difference between HTML & XML, Components of XML, XML Parser, DTD's Using XML with HTML and CSS. Introduction to Web Services, UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services. AJAX –Introduction AJAX programming, improving web page performance using AJAX.

Textbooks:
1. Internet and World Wide Web, Deitel H.M., P.J.Deitel , Pearson

Reference Books:
1. Web Technologies, Uttam K. Roy, Oxford University Press
2. HTML Black Book, Stephen Holzner, Wiley Dreamtech.

3. Web Technology, Rajkamal, Tata McGraw-Hill.
4. Web Technologies: A Computer Science Perspective, Jeffrey C. Jackson, Pearson.
5. XML: How to Program, Deitel&Deitel Nieto.

ETMA144 A DIFFERENTIAL EQUATION AND OPTIMIZATION TECHNIQUES (Credits-4)

UNIT I

Limits and Continuity: Limit at a point, Properties of limit, Computation of limits of various types of functions, Continuity of a function at a point, Continuity over an interval, sum, product and quotient of continuous functions, Intermediate Value Theorem, Types of discontinuities.

UNIT II

Ordinary Differential Equations: Introduction, Basic Concepts, General and particular solutions of a differential equation, Formation of a differential equation, Methods of solving first order, first degree differential equation- Separation of Variable, Homogeneous differential equations, Linear differential equations.

UNIT III

Statistics: Definition, Importance & Limitation of Statistics, Types of data, Data collection technique, Presentation of data- tabulation, bars, histogram, diagrammatic, Measures of central tendency – mean, median and mode.

UNIT IV

Linear Programming: Linear programming problems formulation, solution of linear programming problem using graphical method, simplex method, Big-M method, Duality concept.

Textbooks

1. A textbook of Mathematics for XI-XII Students, NCERT Publication Vol. I-II.
2. S.P. Gupta and V.K Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
3. S.P. Gupta, and P.K.Gupta, Quantitative Techniques and Operations Research, Sultan Chand & Sons.
4. R.L.Rardin, Optimization in Operations Research, Prentice Hall.

ETCA164A   WEB TECHNOLOGIES LAB   (Credits-1)

LIST OF PROGRAMS

The following experiments are expected to be performed in the lab.

1. Write HTML/Java scripts to display your CV in Web Browser.

2. Creation and annotation of static web pages using any HTML editor.

3. Write a program to use XML and JavaScript for creation of your homepage.

4. Write a program in XML for creation of DTD which specifies a particular set of rules.

5. Create a Stylesheet in CSS/XSL and display the document in Web Browser.

6. Create a Registration Form with Table.

7. CSS: Inline Style , Internal Style ,and External Style Sheets 8. JavaScript & HTML:

- Use user defined function to get array of values and sort them in ascending order
- Demonstrate String and Math Object's predefined methods
- Demonstrate Array Objects and Date Object's predefined methods
- Exception Handling
- Calendar Creation: Display all month
- Event Handling · Validation of registration form
- Open a Window from the current window
- Change color of background at each click of button or refresh of a page. Display calendar for the month and year selected from combo box
- On Mouse over event 9. XML
- Create any catalog
- Display the catalog created using CSS or XS

ETCS166A   OBJECT ORIENTED PROGRAMMING LAB (Credits-1)

LIST OF EXPERIENTS

Q1. Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.

Q2. A point on the two-dimensional plane can be represented by two numbers: An X coordinate and a Y coordinate. For example, (4,5) represents a point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates.

Write a program that uses a structure called point to model a point. Define three points and have the user input values to two of them. Then set the third point equal to the sum of the other two and display the value of the new point. Interaction with the program might look like this: Enter coordinates for P1: 3 4 Enter coordinates for P2: 5 7 Coordinates of P1 + P2 are: 8, 11

Q 3. Create the equivalent of a four-function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally, it should display the result. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be _Y' or _N'. Some sample interaction with the program might look like this. Enter first number, operator, second number: 10/ 3 Answer = 3.333333 Do another (Y/ N)? Y Enter first number, operator, second number 12 + 100 Answer = 112 Do another (Y/ N)? N

Q4. A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this: Enter your area code, exchange, and number: 415 555 1212 My number is (212) 767-8900 Your number is (415) 555-1212

Q 5. Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and cenitmetres depending on the object on display.

Q 6. Create a class rational which represents a numerical value by two double valuesNUMERATOR & DENOMINATOR. Include the following public member Functions: • constructor with no arguments (default). • constructor with two arguments. • void reduce () that reduces the rational number by eliminating the highest common factor between the numerator and denominator. • Overload + operator to add two rational number. • Overload >> operator to enable input through cin. • Overload << operator to enable output through cout. Write a main ( ) to test all the functions in the class.

Q 7. Consider the following class definition class father { protected : int age; public; father (int x) {age = x;} virtual void iam ( ) { cout << ─I AM THE FATHER, my age is

: ‖<< age<< end1:} }; Derive the two classes son and daughter from the above class and for each, define iam ( ) to write our similar but appropriate messages. You should also define suitable constructors for these classes. Now, write a main ( ) that creates objects of the three classes and then calls iam ( ) for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam ( ) through the pointer to demonstrate polymorphism in action.

Q 8. Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

Q9. A hospital wants to create a database regarding its indoor patients. The information to store includes a) Name of the patient b) Date of admission c) Disease d) Date of discharge Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived class to store the age of the patients. List the information about all the to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).

Q 10. Make a class Employee with a name and salary. Make a class Manager inherit from Employee. Add an instance variable, named department, of type string. Supply a method to toString that prints the manager's name, department and salary. Make a class Executive inherit from Manager. Supply a method to String that prints the string ―Executive‖ followed by the information stored in the Manager superclass object. Supply a test program that tests these classes and methods.

Q11. Imagine a tollbooth with a class called toll Booth. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ), increments the car total but adds nothing to the cash total. Finally, a member function called displays the two totals. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC kay should cause the program to print out the total cars and total cash and then exit.

Q12. Write a function called reversit ( ) that reverses a string (an array of char). Use for loop that swaps the first and last characters, then the second and next to last characters and so on. The string should be passed to reversit ( ) as an argument. Write a program to exercise reversit ( ). The program should get a string from the user, call reversit ( ), and print out the result. Use an input method that allows embedded blanks. Test the program with Napoleon's famous phrase, ―Able was I ere I saw Elba)‖.

Q13. Create some objects of the string class and put them in a Deque-some at the head of the Deque and some at the tail. Display the contents of the Deque using the forEach ( ) function and a user written display function. Then search the Deque for a particular string, using the first That ( ) function and display any strings that match. Finally remove all the items from the Deque using the getLeft ( ) function and display each item. Notice the order in which the items are displayed: Using getLeft ( ), those inserted on the left (head) of the Deque are removed in —last in first out‖ order while those put on the right side are removed in

—first in first out‖ order. The opposite would be true if getRight ( ) were used.

Q 14. Create a base class called shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data ( ) to initialize base class data Members and another member function display_area ( ) to compute and display the area of figures. Make display_area ( ) as a virtual function and redefine this function in the derived classes to suit their requirements. Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively and display the area. Remember the two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows: Area of rectangle = x * y Area of triangle = ½ * x * y

ETEL 171A   COMMUNICATION SKILLS LAB(Credits-1)

Communication Skills Lab Activity

Activity 1: Self- introduction: Informal introduction & formal introduction; A detailed write up on formal Self Introduction‗; Formal Introduction of oneself in front of the group.

Activity 2: News Reading: Introduction to ‗online News papers‗; Browsing and selecting the preferred Newspaper; Browsing through the News Headlines; Selecting interested News items; Comprehending the content, writing down the essence and reading the News in front of the Group. Discuss 5 to 8 new words or terms, 4 to 5 important personalities of that day‗s news etc.

Activity 3: JAM: Introduction to ‗Just A Minute speech‗ and the ‗Extempore speech‗; Preparation of speech on given topic (different topic for each student); delivery of the speech; Feedback (on content, time management, body language etc. highlighting the positive aspects first.)

Activity 4: News Discussions: Selecting News of the day, Discussing among the group, prepare the news content and prepare the group opinion about the issue and present it in front of the class by the group involving each member; select 5 new words & new usages from the selected news item

Activity 5: Conversation ability: Characteristics of effective conversation; Listening to a few sample conversations; preparing conversation based on the given situation; enacting the situation through effective delivery of the script; feedback & suggestions for improvement.

Activity 6: Role Play: Characteristics of Role Play; assigning roles; developing the content to deliver; enacting the role with effective delivery; feedback & suggestions for improvement.

Activity 7: Public Speaking: Characteristics of effective Public speaking; possible barriers; watching demo online; topic assignment, information gathering & recording; delivery in front of the class; feedback & suggestions for improvement. (Different topic for each student)

Activity 8: Group Discussion: Importance and characteristics; Dos & Don'ts in GD; Demo display; assign topic for the group, Preparation & performance; feedback & suggestions for improvement.

Activity 9: Debate: Difference between Group Discussion & Debating; Watching demo of Debating; Topic for the group of 2 or 4; preparation and performance; feedback & suggestions for improvement.

Activity 10: Interview: Importance & purpose of Job Interview; Interview etiquettes; Watch demo interview; Appear for formal mock interview; feedback & suggestions for improvement.

ETMA121A   Management Thought and Application   (Credit 3)

Unit 1

Foundations of Management

Introduction to Management: Evolution and Overview

Theories of Management: Classical, Behavioral, and Modern

Managerial Roles and Functions

Contemporary Challenges in Management

Unit 2

Organizational Structure and Behavior

Organizational Structure and Design

Organizational Culture and Behavior

Leadership Theories and Styles

Motivation and Employee Engagement

Unit 3

Strategic Management and Decision-Making

Strategic Planning and Analysis

Strategy Formulation and Implementation

Business Ethics and Social Responsibility

Decision-Making Models and Processes

Unit 4

Contemporary Issues and Applications

Managing Change and Innovation

Global and Cross-Cultural Management

Technology and Digital Transformation

Sustainability, CSR, and Ethical Management

Case Studies in Management: Real-World Applications

SEMESTER II

ETCS217A   DATA STRUCTURES   (Credits-4)

Course Overview:

The aim of the course is to introduce basic data structures and algorithms. This course covers the design, analysis, and implementation of data structures and algorithms to solve engineering problems using an object-oriented programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced

data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems.

Objectives and Expected Outcomes

Based on satisfactory completion of the course a student should be able to:

1. Formulate and apply object-oriented programming as a modern tool to solve engineering problems.
2. Demonstrate an understanding of basic data structures and algorithms.
3. Demonstrate the ability to analyze, design, apply and use data structures and algorithms to solve engineering problems and evaluate their solutions.
4. Demonstrate an understanding of analysis of algorithms.

UNIT I

Python: types, expressions, strings, lists, tuples; Python memory model: names, mutable and immutable values; List operations: slices etc - Binary search; Inductive function definitions: numerical and structural induction; Elementary inductive sorting: selection and insertion sort; In-place sorting.
Basic algorithmic analysis input size, asymptotic complexity, O () notation; Arrays vs lists; ; Merge sort ; Quick sort ; Stable sorting.

UNIT II

Dictionaries; More on Python functions: optional arguments, default values; Passing functions as arguments; Higher order functions on lists: map, lter, list comprehension.

Exception handling; Basic input/output; Handling Files; String processing.

UNIT III

Backtracking: N Queens, recording all solutions; Scope in Python: local, global, nonlocal names; Nested functions; Data structures: stack, queue; Heaps.
Abstract data types; Classes and objects in Python; "Linked" lists: find, insert, delete; Binary search trees: find, insert, delete; Height-balanced binary search trees.

UNIT IV

Efficient evaluation of recursive definitions: memorization | Dynamic programming: examples | Other programming languages: C and manual memory management | Other programming paradigms:functional programming.

TEXTBOOK:

1. Narasimha Karumanchi, Data Structures and Algorithms, CarrerMonk Publications
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Clifford Stein, ―Introduction to Algorithms‖, 2nd Ed., PHI
3. Ellis Horowitz and Sartaz Sahani, ―Computer Algorithms‖, Galgotia Publications.

ETCS 257A   DATA STRUCTURES LAB   (Credit 1)

1. Write a program for multiplication and transpose of array.
2. Write a program to compute the transpose of a sparse matrix
3. Write a program to implement push and pop operation in Stack.
4. Write a program to convert a Infix notation to post fix notation using stacks
5. Write a program to evaluate postfix notation using stacks
6. Write a program to implement a linear queue
7. Write a program for swapping two numbers using call by value and call by reference strategies.
8. Write a program to insert and delete a node in linked list. The number of nodes to inserted and deleted should be governed by user.
9. Write a program to implement a linear search arrays and linked list.
10. Using iteration and recursion concepts write programs for finding the element in the array using the Binary search method.
11. Write the programs to implement bubble sort.
12. Write a program using iteration and recursion concepts for quick sort.
13. Write a program to implement merge sort.
14. Write a program to simulate various tree traversal techniques.
15. Write a program to simulate various BFS and DFS.

ETCS219A   FOUNDATION OF COMPUTER SYSTEMS (Credit 4)

Unit I: **10 lecture hours**

Set Theory: Introduction to set theory, Set operations, Algebra of sets, Duality, Finite and Infinite sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Equivalence relations and partitions , Partial ordering relations and lattices Function and its types, Composition of function and relations, Cardinality and inverse relations

Unit II: **12 lecture hours**

Graphs And Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eurelian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula, Trees, Spanning trees, Binary trees and its traversals.

Unit III: **12 lecture hours**

Propositional logic: Basic operations: AND($\wedge$), OR(v), NOT($\sim$), Truth value of a compound statement, propositions, tautologies, contradictions, Validity of Arguments

Group theory: Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Auto morphism, Subgroups and Normal subgroups, Cyclic groups, Co-Sets, Lagrange's theorem.

Unit IV: 10 lecture hours

Recursion and Recurrence Relation: linear recurrence relation with constant coefficients, Homogeneous solutions, Solutions, Total solution of a recurrence relation using generating functions.

Techniques Of Counting: Permutations with and without repetition, Combination.

Text Books

1. Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH.

2. C.L. Liu, "Elements of Discrete Mathematics", TMH.

Reference Books/Materials

1. Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI.

2. NarsinghDeo, "Graph Theory with Application to Engineering and Computer Science", PHI.

3. J. P. Trembly& P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill.

4. Vinay Kumar, "Discrete Mathematics", BPB Publications.

ETCS222A COMPUTER ORGANIZATION AND ARCHITECTURE (Credits-4)

Unit I: 12 lecture hours

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU–registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look- ahead adder, etc. multiplication – shift-andadd, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

Unit II: 10 lecture hours

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU.

Memory system design: semiconductor memory technologies, memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

Unit III: **8 lecture hours**

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

Unit IV: **10 lecture hours**

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Text Books

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

Reference Books/Materials

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

ETEC210A   DIGITAL ELECTRONICS   (Credit 4)

Unit I: **10 lecture hours**

UNIT – I

Number Systems and Codes: Review of number systems, BCD codes and arithmetic, Gray code, self-complimenting codes, Error detection and correction principles.

Digital Circuits: Switching algebra & simplification of Boolean expressions. De Morgan's Theorem. Implementations of Boolean expressions using logic gates

Unit II: 10 lecture hours

Combinational Logic Design: Combinational circuit analysis and synthesis, Techniques for minimization of Boolean functions such as Karnaugh map, VEM and Quine-Mc Cluskey methods. Design of arithmetic circuits, code convertors, multiplexers, demultiplexers, encoders, decoders & comparators. Parity generators and checker.

Introduction to Sequential Logic: Need for sequential circuits, Binary cell, Latches and flip-flops. RS, JK, Master-Slave JK, D & T flip flops.

Unit III: 10 lecture hours

Synchronous Sequential Circuit Design: Fundamentals of Synchronous sequential circuits, Classification of synchronous machines, Analysis of Synchronous Sequential circuits, Design of Synchronous and Asynchronous Counters, Shift registers & Ring counters, Analysis and design of Finite State Machines. Timing issues in synchronous circuits.

Logic Families: Performance metrics of logic gates, Basic Transistor-Transistor Logic and CMOS logic.

Unit IV: 10 lecture hours

Asynchronous Sequential Circuits: Fundamentals of Asynchronous Sequential circuits. Analysis and design of Asynchronous Sequential circuits. Pulse mode and Fundamental-mode Circuits. Cycles, Races and Hazards in asynchronous circuits.

Text Books
1. William I. Fletcher, ―An Engineering approach to Digital Design‖, Prentice Hall of India
2. C.H.Roth, ―Fundamentals of Logic Design, Thomson
3. Morris Mano, "Digital Design", PHI, 2nd Ed.

Reference Books/Materials
1. J. Nagrath, "Electronics, Analog & Digital", PHI.
2. B. S. Nai, "Digital Electronics and Logic Design", PHI.
3. Balabanian and Carlson, "Digital Logic Design Principles", Wiley Pub.

ETEC 256A   DIGITAL ELECTRONICS LAB   (Credit 10)

List of experiments:

- Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.

- Implementation of the given Boolean function using logic gates in both SOP and POS forms.
- Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
- Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
- Implementation of 4x1 multiplexer using logic gates.
- Implementation of 4-bit parallel adder using 7483 IC.
- Design, and verify the 4-bit synchronous counter.
- Design, and verify the 4-bit asynchronous counter.
- Static and Dynamic Characteristic of NAND and Schmitt-NAND gate(both TTL and MOS)
- Study of Arithmetic Logic Unit

ETCS 211A   OPERATING SYSTEMS (4 Credit)

Unit I: **6 lecture hours**

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS-Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Unit II: **12 lecture hours**

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non-preemptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit III: **12 lecture hours**

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free- space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Unit IV: **10 lecture hours**

Process-Synchronization & Deadlocks: Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc. Definition of Deadlocks, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

I/O Systems: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

Text Books

1.   Silbersachatz and Galvin, "Operating System Concepts", Pearson

Reference Books/Materials

1.   Tannenbaum, "Operating Systems", PHI, 4th Edition.
2.   William Stallings, "Operating Systems Internals and Design Principles", PHI
3.   HallMadnick, J. Donovan, "Operating Systems", Tata McGraw Hill.
4.   W. Tomasi, "Electronic Communication Systems" Pearson Education, 5th Edition

ETCS323A   JAVA PROGRAMMING   (4 Credit)

Unit I: **12 lecture hours**

Introduction to Java: Introduction to Java: Importance and features of Java, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping: if..else, switch,?: operator, while, do, for statements, labeled loops, jump statements: break, continue return. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance.

Unit II: **9 lecture hours**

Arrays and Strings: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy, abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

Unit III: **9 lecture hours**

Exceptional Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Run able interface, inter thread Communication, suspending, resuming and stopping threads.

Unit IV: **15 lecture hours**

Input/output Programming: Basics Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (Lang, util, io, net).

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes.

Text Books

1. Cay S. Horstmann, "Core Java Volume – I Fundamentals", Pearson.

Reference Books/Materials

1. Herbert Schildt, "Java – The Complete Reference", Oracle Press.

ETCS361A   JAVA PROGRAMMING LAB   (Credit 1)

List of programs

1. Create a java program to implement stack and queue.
2. Write a java program to demonstrate dynamic polymorphism.
3. Write a java program to implement various shapes using Abstract class
4. Write a java program to demonstrate interfaces.
5. Write a java program to show multithreaded producer and consumer application.
6. Create a java programs that make use of all the 5 exception keywords.
7. Convert the content of a given file into the uppercase content of the same file.
8. Develop a scientific calculator using swings.
9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.
10. Create a simple java bean having bound and constrained properties.

ETCA326A   ENTERPRISE COMPUTING IN JAVA (Credit 4)

Unit I: **10 lecture hours**

Design of User Interfaces: Swing, Japplet, Icons and Labels, Text Fields, Buttons, Jbutton Class, CheckBox, Radio Buttons, The Container, Panel, Windows, and Frame Classes, Combo Box, Tabbed Panes, ScrollPanes, Trees, Tables, Custom Rendering of Jlist Cells

Unit II: **12 lecture hours**

Socket Programming: Connecting to a server, implementing a server, Sending E-mail, Making URL connections, Advance Socket Programming.

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL statements, working with Result Set Object & Result Set Meta Data.

Unit III: **10 lecture hours**

Servlets: Introduction to Servlets, Life cycle of Servlets, Creating, Compiling and running Servlets, Reading the Servlets Parameters, Reading Initialization parameter, Packages-javax.servlet Package, Handling HTTP Request and Response (GET / POST Request), Cookies and Session Tracking.

Unit IV: **9 lecture hours**

JSP: JSP Architecture, JSP Access Mode, JSP Syntax Basic (Directions, Declarations, Expression, Scriplets and Comments, JSP Implicit Object, Object Scope, Synchronization Issue, Session Management.

Text Book

1. Gary Cornell and Horstmann Cay S., "Core Java, Vol I and Vol II", Sun Microsystems Press.
2. Herbert Schildt, "Java: The Complete Reference", McGraw-Hill.

Reference Books/Materials

1. Philip Hanna, "JSP: The Complete Reference", McGraw-Hill.

2. Deital and Deital, "Java How to Program", Prentice Hall.

ETCA366A   ENTERPRISE COMPUTING IN JAVA LAB   (Credit 1)

1. Create a java program to implement stack and queue.
2. Write a java program to demonstrate dynamic polymorphism.
3. Write a java program to implement various shapes using Abstract class
4. Write a java program to demonstrate interfaces.
5. Write a java program to show multithreaded producer and consumer application.
6. Create a java programs that make use of all the 5 exception keywords.
7. Convert the content of a given file into the uppercase content of the same file.
8. Develop a scientific calculator using swings.
9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.
10. Create a simple java bean having bound and constrained properties.

ETCS307A DATABASE MANAGEMENT SYSTEMS   (Credits-4)

UNIT I

Basic concepts: Database & Database Users, Characteristics of the Database, Database Systems.: Concepts & Architecture, Date Models. Schemas & Instances, DBMS Architecture & Data Independence, Data Base languages & Interfaces, Data Modeling using the Entity-Relationship Approach
Relational Model Languages & Systems, Relational Data Model & Relational Algebra, Relational Model Concepts, Relational Model Constraints, Relational Algebra

UNIT II

Conventional Data Models & Systems, Network, Data Model & IDMS Systems, Membership types & options in a set, DML for the network model, Navigation within a network database
Hierarchical Data Model & IMS System, Hierarchical Database structure: HSAM, HISAM, HDAM & HIDAM organization, DML for hierarchical model, Overview of IMS

UNIT III

Relational Data Base Design, Function Dependencies & Normalization for Relational Databases
Functional Dependencies, Normal forms based on primary keys (INF, 2NF, 3NF & BCNF), Lossless join & Dependency preserving decomposition.

UNIT IV

Concurrency Control & Recovery Techniques: Concurrency Control Techniques, Locking Techniques, Time stamp ordering, Granularity of Data items
Recovery Techniques: Recovery concepts, Database backup and recovery from catastrophic failures

TEXTBOOKS:

1. Date, C.J., "An Introduction to Database Systems", Narosa Publishing House. New Delhi.
2. Desai, B'., "An Introduction to Database Concepts", Galgotia Publications. New Delhi.
3. Elmsari and Navathe, "Fundamentals of Database Systems", Addison Wesley, New York.
4. Ullman, J.D., "Principles of Database Systems", Galgotia Publications. New Delhi.

ETCS 355A   DATABASE MANAGEMENT SYSTEMS LAB (Credit 1)

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE.
4. Write the queries to implement the joins.
5. Write the queries for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().
6. Write the queries to implement the concept of Integrity constrains
7. Write the queries to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.

ETCA264A MOBILE APPLICATION DEVELOPMENT (Credits-4)

Unit I: **12 lecture hours**

Introduction to Mobile Computing: Concept of Mobile Communication, Different generations of wireless technology, Basics of cell, cluster and frequency reuse concept, Noise and its effects on mobile, Understanding GSM and CDMA, Basics of GSM architecture and services like voice call, SMS, MMS, LBS, VAS, Different modes used for Mobile Communication, Architecture of Mobile Computing(3 tier), Design considerations for mobile computing, Characteristics of Mobile Communication, Application of Mobile Communication, Security Concern Related to Mobile Computing, Middleware and Gateway required for mobile Computing, Making Existing Application Mobile Enable, Mobile IP, Basic Mobile Computing Protocol

Unit II: **9 lecture hours**

Introduction to Android Programming: Overview of Android, Android Internals, Android for mobile apps development, Environment setup for Android apps Development, Framework -Android-SDK, Emulators - Android AVD, Android Emulation – Creation and set up, First Android Application

Unit III: **9 lecture hours**

Android Activities and GUI Design: Activity Lifecycle of Android, Design criteria for Android Application : Hardware Design Consideration, Design Demands For Android application, Intent, Activity, Activity Lifecycle and Manifest, Creating Application and new Activities, Simple UI -Layouts and Layout properties: Introduction to Android UI Design, Introducing Layouts, Fragments, Push Button , Text / Labels , Edit Text, Toggle Button , Padding

Unit IV: **10 lecture hours**

Background Tasks: Customizations: Floating hints and Auto Complete, Create Custom Layout, Create Custom Toast.

Save Data Locally on Phone: Save User Preferences, Save data using text files, Making use of Async Task class: Intro to Async Task Loader, load In Background() , Async Task Loader callbacks , Benefits of loaders . Connecting to data by SQL Lite Database: Overview of SQLite, Open Helper Android class, Querying (dev) Searching (user) databases, Best practices for using databases in Android, Best practices for testing your database

Permissions: The permissions model, Libraries: Using libraries, Widgets: What are widgets?, When to use them and how to implement them, Publishing your App: Different ways to monetize your app, Making and publishing APKs: Guidelines for publishing in Google Play , Make and sign the APK, Beta test your app , Publish your app to Google Play

Text Books

1. Reto Meier, "Professional Android Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. Sayed Y Hashimi and SatyaKomatineni, "Pro Android", Wiley India Pvt Ltd

ETCA264A   MOBILE APPLICATION DEVELOPMENT LAB (Credit 1)

List of experiments:

1. Getting Started with Android Development.

2. Activities and Views: Android Manifest.xml, Activity Class, Basic View

Components: Layouts and Buttons

3. Navigation with Data: Working with Intent, Sharing Data between Activities, Application Class.

4. Android Resources: String Resources, Loading Strings in XML, Loading Strings in Code, the Resource Values Folder

5. Drawables - Image Basics, Drawable Folders and Qualifiers, Dimensions, Image Padding, The ImageButton Widget

6. Lists Implementing an Android List, ListView, ListActivity, Empty Lists, ListAdapter, Sorting the Adapter, Overriding ArrayAdapter, List Interaction

7. Dialogs, New and Old: AlertDialog, Custom Dialog, Support Library, Fragments, DialogFragment.

8. Menus: Options Menu, Modifying an Options Menu, Context Menu

9. Saving Data with Shared Preferences: Shared Preferences, Getting Started with Shared Preferences, Preference Activity

10. Saving Data with a Database: Setting Up SQLite, Creating a Helper , using the Helper, Cursor and Cursor Adapater

11. Threading with AsyncTasks: Threading in Android, AsyncTask, Tracking Progress

12. Styles and Themes: Introduction to Styling: Defining Styles, Defining Themes, Style Inheritance, Direct Theme References

13. Develop an Android based Project

ETCS306A   DATA WAREHOUSING AND DATA MINING (Credit 4)

Unit I: **10 lecture hours**

Introduction: Evolution Of Data Warehousing (Historical Context), The Data Warehouse - a Brief Overview, Characteristics, Operational Database Systems and Data Warehouse(OLTP & OLAP), Data Marts, Metadata.

Principles of Data Warehousing(Architecture and Design Techniques): System Processes, Data Warehousing Components, Architecture for a Warehouse, Three-tier Data Warehouse Architecture, Steps for the design and construction of Data Warehouses, Conceptual Data Architecture, Logical Architectures, Design Techniques.

Multidimensional Data Models: Types of Data and Their Uses, From Tables and Spreadsheets to Data Cubes, Identifying Facts and Dimensions, Fact Tables, Designing Fact Tables, Designing Dimension Table, Data Warehouse Schemas- STAR Schema, Snowflake Schema, OLAP, OLAP Operations**,** Hypercube**,** ROLAP, MOLAP, From Data warehousing to Data Mining, Data warehouse Usage

Unit III: **12 lecture hours**

Data Mining: Motivation, Importance, Knowledge Discovery Process (KDD), KDD and Data Mining, Data Mining vs. Query Tools, Kind of Data, Data preprocessing, Functionalities, Interesting Patterns, Classification of data mining systems, Major issues.

Unit IV: **12 lecture hours**

Classification and Prediction: Classification & Prediction, Issues Regarding Classification & Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back Propagation, Classification Parameters.

Cluster Analysis: Types of Data in Cluster Analysis, Partitioning Method, Hierarchical Method, Density Based Method, Grid Based Method, Model Based Clustering Method, Outlier Analysis.

Mining Association Rules: Association Rule Mining, Market Basket Analysis, Types of Association Rules, Methods for Mining Association

Text Books

Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd

Reference Books/Materials

1. W. H. Inmon, "Building the operational data store", 2nd Ed., John Wiley.
2. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons.
3. Sam Anahony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley.

ETCA227A   WEB BASED PROGRAMMING USING PHP   (Credit 4)

Unit I: **8 lecture hours**

Introduction to web applications: HTML, Client-Side Scripting Vs Server-Side Scripting, Web Servers: Local Servers and Remote Servers, Installing Web servers, Internet Information Server (IIS) and Personal Web Server (PWS). Static website vs Dynamic website development.

Unit II: **12 lecture hours**

Introduction to PHP: Start and End Tags of PHP, Data types in PHP, Variables, Constants, operators and Expressions, printing data on PHP page, Control statements – if, switch case, for, while, do while.

Arrays: Initialization of an array, Iterating through an array, Sorting arrays, Array Functions

Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions.

Unit III: **12 lecture hours**

Working with Forms: Get and Post Methods, Query strings, HTML form controls and PHP

Maintaining User State: Cookies, Sessions and Application State.

Working with Files: Opening and Closing Files, Reading and Writing to Files, Getting Information on Files, OOP's – Instantiation, Modifiers, Inheritance, Interfaces, Exceptions, Static Methods and properties, Auto load, Reflection, Type Hinting and class constant.

Unit IV: **8 lecture hours**

PHP Database Connectivity: Introduction to MYSQL, creating database and other operations on database, connecting to a database, use a particular database, sending query to database, Parsing of the query results, Checking data errors. MVC overview, security, Ajax basics, PHP with Ajax

Text Books

1. RasmusLerdorf and Kevin Tatroe, "Programming PHP", O'Reilly.

Reference Books/Materials

1. Robin Nixon, "PHP, MySQL, and JavaScript: A Step-By-Step Guide to Creating Dynamic Websites", O'Reilly Media

ETCA325A   LINUX ENVIRONMENT   (Credit 4)

Unit 1

Introduction to Linux and Open Source Principles
History and Philosophy of Linux
Overview of Open Source Software
Linux Distributions and Installation
The Linux Command Line Interface (CLI) and Basic Commands
File Systems, Partitions, and Storage Management

Unit 2

Linux System Administration and Security
User and Group Management
File Permissions, ACLs, and Security
Process Management, System Services, and Boot Process
Package Management (APT, Yum) and Software Installation
System Monitoring, Performance Tuning, and Troubleshooting

Unit 3

Linux Networking and Services
Networking Fundamentals in Linux
Network Configuration, Troubleshooting, and Tools
Firewall Management (iptables) and Security Best Practices
Remote Access and File Sharing (SSH, Samba)
Web Services (Apache, Nginx), DNS, and DHCP

Unit 4

 Advanced Linux Topics and Automation
Shell Scripting (Bash) and Automation with Cron
Virtualization with VirtualBox and KVM
Introduction to Containers (Docker) and Container Orchestration (Kubernetes)
Linux Server Deployment and Management
Final Project: Setting up a Linux Server with Selected Services

ETCA365A   LINUX ENVIRONMENT LAB   (Credits-1)

Course Objective: This course will prepare students to develop software in and for Linux/UNIX environments.

Topics to be covered include basic operating system concepts, effective command line usage, shell programming, the C language, programming development tools, system programming, network programming (client-server model and sockets), and GUI programming

LIST OF EXPERIMENTS

1. Installing Linux: Installing the Operating System
2. Exploring the System: Starting Up and changing run levels, Using the man utility, using built-in help switches for commands, Using Auto completion 3. Common System Utilities: Using cd, using pwd, using mkdir, using rmdir, Using Touch, Using ls, using mv, using cp, Using cat, Using Redirection, rm, Using vi, Searching for files: grep, frep and similar commands
3. The XWindow System: Preamble, Virtual terminals, Setting up a basic display, X clients, Window Managers, Display Manager, xinit and startx, system-config-display
4. The Shell and Shell Scripting: Different kind of shells (c shell, bash shell, korn shell and others), A simple Script, using variables in scripts, Using Control Structures
5. User Accounts: Preamble, manually creating a new group, automatically creating a new user, automatically creating new groups, using sticky bits, share the file between users and groups.
6. Managing and Installing Software: Installing, Querying and Uninstalling Packages Third party tools, Building Software from Source 8. Understanding Devices: Determining device type, creating devices, mounting and umounting devices

ETCS304A   COMPUTER NETWORKS   (Credit 4)

Unit I: **8 lecture hours**

Data communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum

Unit II: 12 lecture hours

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA

Unit III: 12 lecture hours

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

Unit IV: 8 lecture hours

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

Text Books

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

ETCS214A   THEORY OF COMPUTATION   (4Credit)

Unit I: 8 lecture hours

Introduction to Compiling: Compilers, Analysis of the source program, the phase of a compiler, Cousins of the compiler, the grouping of phases, Compiler-constructions tools.
A Simple One-Pass Compiler: Syntax definition, Syntax-directed translation, Parsing, A translator for simple expressions, Lexical analysis, Incorporating a symbol table, Abstract stack machines.

Unit II: 12 lecture hours

Lexical Analysis: The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language of specifying lexical analyzers, Design of a lexical analyzer generator.

Syntax Analysis: The role of the parser, writing a grammar, Top-down parsing; Bottom-up parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars, Parser generators.

Unit III: 12 lecture hours

Syntax-Directed Translation: Syntax-direct definitions, Construction of syntax trees, Bottom-up evaluation of S- attributed definitions, L-attributed definitions, and Top-down translation.

Type Checking: Type systems, Specification of a simple type checker.

Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, Parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques.

Unit IV: 8 lecture hours

Intermediate Code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions.

Code Generation: Issues in the design of a code generator, Target machine, Run-time storage management, Basic blocks and flow graphs.

Code Optimization: Introduction, The Principle sources of optimization.

Text Books

1. Aho, Ullman & Ravi Sethi, "Principles of Compiler Design", Pearson Education.

Reference Books/Materials

1. Andrew L. Appel, "Modern Compiler Implementation in C",Delhi, Foundation Books.
2. Dick Gruneet. Al., "Modern Compiler Design", Wiley Dreamtech.
1. R. J. Schalkoff, "Artificial Intelligence – An Engineering Approach", McGraw Hill Int. Ed. Singapore.
2. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House.
3. Tim Johns, "Artificial Intelligence, Application Programming", Wiley Dreamtech.

ETCA267A   WEB BASED PROGRAMMING USING PHP LAB

List of Experiments (Indicative)

1	WAP using Client-side scripting to perform arithmetical tasks and display results.	**2 lab hours**
2	WAP in PHP to accept values from user and check the eligibility to vote, and print result on screen.	**2 lab hours**
3	WAP in PHP to display table of a given no.	**2 lab hours**
4	WAP to transfer data from one page to another using PHP. Working in forms and using get and post method.	**2 lab hours**
5	WAP to manage data and information across the pages like in shopping carts etc.	**2 lab hours**
6	WAP a program to count total numbers of hit (visitor no) on the site and also total no of users online.	**4 lab hours**
7	Make a page to store the data in file and reading the data from file.	**4 lab hours**
8	Make an application to upload image file to website and display on site. Image to be uploaded dynamically using PHP controls etc.	**4 lab hours**
9	Write SQL Commands to create database, create a table in it and store data in this table. Also write commands to search and delete the record.	**4 lab hours**
10	Write PHP code to connect to database (MySQL) , and perform following operations	**4 lab hours**

ETCS362A   DATA WAREHOUSING AND DATA MINING LAB (Credit 1)

List of Experiments (Indicative)

1	Demonstration of data pre-processing on datasets	**2 lab hours**
2	To list all the categorical (or nominal) attributes and the real valued attributes	**4 lab hours**

3	Create a data classification model using decision tree	**4 lab hours**
4	Create a data classification model using Naive Bayes	**2 lab hours**
5	Create a data classification model using rule based classifies	**2 lab hours**
6	Create a data classification model using statistical classifiers.	**4 lab hours**
7	Create a data classification model using neural networks.	**4 lab hours**
8	Create a data classification model	**4 lab hours**
9	Demonstrate the working of k-means algorithm for clustering the data.	**4 lab hours**
10	Create a clustering model using hierarchical clustering algorithm.	**2 lab hours**

ETCA365A   LINUX ENVIRONMENT LAB (Credits-1)

LIST OF EXPERIMENTS

1. Installing Linux: Installing the Operating System
2. Exploring the System: Starting Up and changing run levels, Using the man utility, using built-in help switches for commands, Using Auto completion 3. Common System Utilities: Using cd, using pwd, using mkdir, using rmdir, Using Touch, Using ls, using mv, using cp, Using cat, Using Redirection, rm, Using vi, Searching for files: grep, frep and similar commands
3. The XWindow System: Preamble, Virtual terminals, Setting up a basic display, X clients, Window Managers, Display Manager, xinit and startx, system-config-display
4. The Shell and Shell Scripting: Different kind of shells (c shell, bash shell, korn shell and others), A simple Script, using variables in scripts, Using Control Structures
5. User Accounts: Preamble, manually creating a new group, automatically creating a new user, automatically creating new groups, using sticky bits, share the file between users and groups.
6. Managing and Installing Software: Installing, Querying and Uninstalling Packages Third party tools, Building Software from Source 8. Understanding Devices: Determining device type, creating devices, mounting and umounting devices

ETCA367A   PRACTICAL TRAINING   (Credit 1)

The course is designed to expose the students to industry environment and to take up on-site assignment as trainees or interns.

This course enables students to face the real time problems which are usually faced by working professionals while working in the industry. While on this training program, students come to know about technical as well individual skills required by a professional for survival in the market .In fact, this course is about industrial implementation of the technologies. This course enable students to learn technologies on industrial level. The student will be working closely with the technical team. This course enhances student's ability to think out of the box and suggest new ways of implementing ideas in a better manner and should be able to brainstorm and come up with innovative ideas.

Course Content

Six weeks of work at an industry site. Supervised by an expert at the industry.

Evaluation will be based on Internship Report, Presentation and Project Review**:**

ETCS314A   MOBILE COMPUTING   (Credit 4)

UNIT I   **12 LECTURE HOURS**

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signaling.

Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signaling.

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes.

UNIT II   **8 LECTURE HOURS**

Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless markup Languages (WML).

UNIT III   **12 LECTURE HOURS**

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G.

Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

UNIT IV   **12 LECTURE HOURS**

Global Mobile Satellite Systems: case studies of the IRIDIUM and GLOBALSTAR systems.

Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

TEXT BOOKS:

1. Yi-Bing Lin &ImrichChlamtac, "Wireless and Mobile Networks Architectures", John Wiley & Sons.

REFERENCE BOOKS:

1. Mark Ciampa, "Guide to Designing and Implementing wireless LANs", Thomson learning, Vikas Publishing House.

2. Ray Rischpater, "Wireless Web Development", Springer Publishing.

3. P.Stavronlakis, "Third Generation Mobile Telecommunication systems", Springer Publishers.

4. Hansmann, "Principles of Mobile Computing", Wiley Dreamtech.

ETCA324A   **.NET FRAMEWORK**   **(Credit 4)**

Unit I: **10 lecture hours**

Introduction to .NET technologies: Features of .NET, .NET Framework, CLR, MSIL, .NET class library, .NET Languages, CTS, assemblies, manifest, and metadata, what is ASP.NET? Difference between ASP and ASP.NET.

Unit II: **10 lecture hours**

Controls in ASP.NET: Overview of Dynamic Web page, Understanding ASP.NET Controls, Applications, Web servers, Installation of IIS. Web forms, web form controls - server controls, client controls. Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box. Adding controls at runtime. Running a web Application, creating a multiform web project. Form Validation: Client-side validation, server-Side validation, validation Controls: Required Field Comparison Range. Calendar control, Ad rotator Control, Internet Explorer Control.

Unit III: **10 lecture hours**

Overview of ADO.NET and XML: What is ADO.NET, from ADO to ADO. NET. ADO.NET architecture, Accessing Data using Data Adapters and Datasets, using Command & Data Reader, binding data to data bind Controls, displaying data in data grid, XML basics, attributes, fundamental XML classes: Document, text writer, text reader. XML validations, XML in ADO.NET, XML Data Document.

Unit IV: **10 lecture hours**

ASP.NET Applications: Creating, tracking, caching, error handling, Securing ASP.NET applications - form based applications, window-based application, State management- View state, Session state, Application state, Building ASP.NET web services, working with ASP.NET applications, creating custom controls.

Text Books

1. Stephen Walther, "ASP.NET Unleashed", SAMS publications

Reference Books/Materials

1.ASP.NET, WroxPublications
2.ASP.NET and VB.NET, Wrox Publication
3.ASP.NET and C#.NET, Wrox Publication.

ETCA364A   NET FRAMEWORK LAB   (Credit 1)

List of Experiments (Indicative)

1	1. Write a program using web controls to a)Factorial of a number b) Money Conversion c) Quadratic Equation d) Temperature Conversion e) Login Control	**4 lab hours**
2	Write a program for Ad rotator Control	**4 lab hours**

3	2. Write a program for Calendar control
	
	   a) Display a message in calendar
	
	   b) Display vacations in calendar
	
	   c) Select a day in calendar control using style
		4 lab hours

4	Write a program for Tree view control and use various operation of Tree view control	**4 lab hours**
5	Write a program to design graphical user interface and display records stored in database	**4 lab hours**
6	Write a program to insert and delete the records in database	**4 lab hours**
7	Write a program of Data binding using drop down list control	**4 lab hours**
8	Design a interactive website for admissions in university.	**4 lab hours**

ETCS 202A   SOFTWARE ENGINEERING   (Credit 4)

Unit I: **10 lecture hours**

Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirement documentation, Nature of SRS, Characteristics & organization of SRS.

Unit II: 12 lecture hours

Software Metrics: Software measurements: What & Why, Token Count, Size Estimation like lines of Code & Function Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics, Cost Estimation Models: COCOMO,COCOMO-II.

System Design: Design Concepts, design models for architecture, component, data and user interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top Down and Bottom-Up design approaches; Functional Versus Object Oriented Approach, Design Specification.

Coding: TOP-DOWN and BOTTOM-UP structure programming, Information Hiding, Programming Style, and Internal Documentation, Verification.

Unit III: 11 lecture hours

Unified Approach and Unified Modeling Language: The Unified Approach: Layered Approach to OO Software Development, UML: UML Diagrams for Structure Modeling, UML Diagrams for Behavior Modeling, UML Diagram for Implementation and deployment modeling.

Software Reliability: Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models, Basic Model, Logarithmic Poisson Model, Software Quality Models, CMM & ISO 9001.

Unit IV: 12 lecture hours

Software Testing: Testing process, Design of test cases, functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Path Testing, Data flow and mutation testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing, Testing Tools & Standards.

Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

Text Books

1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International.

2. R. S. Pressman, "Software Engineering – A practitioner's approach", McGraw Hill Int. Ed.

3. W.S. Jawadekar, "Software Engineering – Principles and Practices", McGraw Hill

Reference Books/Materials

1. Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, TMH.

2. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.

3. I. Sommerville, "Software Engineering", Addison Wesley.

4. K. Chandrasehakhar, "Software Engineering & Quality Assurance", BPB.

ETCS422A   CLOUD COMPUTING   (Credit 4)

Introduction: Cloud computing fundamentals, the role of networks in Cloud computing, Essential characteristics of Cloud computing, Cloud deployment model, Cloud service models, Multi-tenancy, Cloud cube model, Cloud economics and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS. Open Source platforms: OpenStack.

Unit II: **12 lecture hours**

Virtualization, Server, Storage and Networking: Virtualization concepts, types, Server virtualization, Storage virtualization, Storage services, Network virtualization, service virtualization, Virtualization management, Virtualization technologies and architectures, Internals of virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, Hyper V, VMware hypervisors and their features.

Unit III: **10 lecture hours**

Data in Cloud Computing: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-

Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing using MapReduce.

Cloud Security: Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges: Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.

Unit IV: **8 lecture hours**

Issues in Cloud Computing: Implementing real time application over cloud platform, Issues in Inter -cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud

Text Books

1. Cloud Computing, Dr. Kumar Saurabh, Wiley Publication

Reference Books/Materials

1. Cloud computing – Automated virtualized data center, Venkata Josyula, CISCO Press

2. Cloud and virtual data storage networking, Greg Schulr CRC Press

3. Handbook of Cloud Computing, BorkoFurht, Springer

ETCA362A   CLOUD COMPUTING LAB   (Credit 1)

List of Lab experiments:

1	Development of applications on Google app engine.	**4 lab hours**
2	Case study of private Cloud setup through OpenStack	**4 lab hours**
3	Case study of private Cloud setup through CloudStack	**4 lab hours**
4	Case study of XEN/VMware/KVM hypervisor	**4 lab hours**
5	Case study of Amazon ec2.	**4 lab hours**

ETCA368A   MAJOR PROJECT   (Credit 3)

The assignment to normally include:

1. Review and finalization of the Approach to the Problem relating to the assigned topic.
2. Preparing an Action Plan for conducting the investigation, including team work.
3. Detailed Analysis/Modelling/Simulation/Design/ProblemSolving/Experiment as needed.
4. Final development of product/process, testing, results, conclusions and future directions.
5. Preparing a report in the standard format for being evaluated by the Department.
6. Final project presentation before a Departmental Committee.

ETCA 330A NETWORK SECURITY & CRYPTOGRAPHY (Credit 4)

Unit I: **8 lecture hours**

Introduction: Plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography.

Unit II: **12 lecture hours**

Symmetric key algorithms: introduction, algorithms types and modes, DES, AES.

Asymmetric key algorithms: introduction, history of asymmetric key cryptography, RSA symmetric and asymmetrickey cryptography together, Digital signature.

Unit III: **8 lecture hours**

Internet security protocols: basic concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), SecureHyper Text Transfer protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), SSL versus SET, Electronic Money, Email Security

Unit IV: **8 lecture hours**

User Authentication and Kerberos: Introduction, Authentication basics, Passwords, authentication tokens, certificate based authentication, biometric based authentication, Kerberos, key distribution center (KDC), Security handshake pitfalls, single sign on(SSO) approach.

Text Books

1. AtulKahate, "Cryptography and Network Security", TMH

2. Mani Subramaniam , "Network Management Principles & Practices" AWL

ETCA372A   NETWORK SECURITY & CRYPTOGRAPHY LAB (Credit 1)

List of Experiments (Indicative)

1	Understanding types of Network Attacks: Case study of different types of passive and active attacks (2 each).	**2 lab hours**
2	To study Symmetric key encryption principles.	**2 lab hours**
3	Write a program to implement DES algorithm or use existing library programs to test it.	**2 lab hours**
4	Examine different techniques for authentication. Study examples of each type.	**2 lab hours**
5	Examine how PGP works.Use the tools available at gnupg.org, study the commands and use it.	**2 lab hours**
6	To study MD5 algorithm. Use existing implementations in your own code to generate and verify MD5 hashes for files.	**2 lab hours**
7	To study RSA algorithm.	**2 lab hours**
8	Study of Secure Socket Layer (SSL).	**2 lab hours**
9	To study security requirements for websites	**2 lab hours**
10	To study Wireless Network security.	**2 lab hours**
11	Examine how firewalls work.	**2 lab hours**

Annexure1

	School of Engineering & Technology, BCA (Scheme of Studies) Academic Year 2019-22		

	Semester I (ODD)		

S.No	Course Code	Course Title	Credits
1	ETMC121A	MANAGEMENT THOUGHTS AND APPLICATIONS	3
2	ETCA131A	INTRODUCTION TO COMPUTERS & IT, OFFICE AUTOMATION	4
3	ETCS103A	PROGRAMMING FOR PROBLEM SOLVING	4
4	ETMA163A	BASICS OF MATHEMATICS	4
5	ETCH 125A	ENVIRONMENTAL STUDIES	3
6	ETCA161A	INTRODUCTION TO COMPUTERS & IT, OFFICE AUTOMATION LAB	1
7	ETCS153A	PROGRAMMING FOR PROBLEM SOLVING LAB	1
8		OPEN ELECTIVE - I	6
	Semester II (EVEN)		
1	ETEL 101A	COMMUNICATION SKILLS	4
2	ETCS112A	OBJECT ORIENTED PROGRAMMING	4
3	ETCS316A	WEBTECHNOLOGIES	4
4	ETMA144A	DIFFERENTIAL EQUATIONS & OPTIMIZATION TECHNIQUES	4

5	ETCA 164A	WEB TECHNOLOGIES LAB	1
6	ETCS166A	OBJECT ORIENTED PROGRAMMING LAB	1
7	ETEL 171A	COMMUNICATION SKILLS LAB	1
8		OPEN ELECTIVE - II	6

Semester III (ODD)

1	ETCS217A	DATA STRUCTURES	4
2	ETEC210A	DIGITAL ELECTRONICS	4
3	ETCS219A	FOUNDATION OF COMPUTER SYSTEMS	4
4	ETCS 211A	OPERATING SYSTEMS	4
5	ETCS323A	JAVA PROGRAMMING	4
6	ETCS 257A	DATA STRUCTURES LAB	1
7	ETEC 256A	DIGITAL ELECTRONICS LAB	1
8	ETCS361A	JAVA PROGRAMMING LAB	1
9	ETCA268A	Seminar	1
10		Value Added Course	

Semester IV (EVEN)

1	ETCS222A	COMPUTER ORGANIZATION & ARCHITECTURE	4
2	ETCS307A	DATABASE MANAGEMENT SYSTEMS	4
3	ETCA326A	ENTERPRISE COMPUTING IN JAVA	4
4	SMMC123A	BUSINESS APPLICATIONS OF ECONOMICS	3
5	ETCA264A	MOBILE APPLICATION DEVELOPMENT	4
6	ETCA366A	ENTERPRISE COMPUTING IN JAVA LAB	1
7	ETCS 355A	DATABASE MANAGEMENT SYSTEMS LAB	1
8	ETCA264A	MOBILE APPLICATION DEVELOPMENT LAB	1

Semester V (ODD)

1	ETCS306A	DATA WAREHOUSING AND DATA MINING	4

2	ETCA227A	WEB BASED PROGRAMMING USING PHP	4
3	ETCA325A	LINUX ENVIRONMENT	4
4	ETCS304A	COMPUTER NETWORKS	4
5	ETCS214A	THEORY OF COMPUTATION	4
6	ETCA267A	WEB BASED PROGRAMMING USING PHP LAB	1
7	ETCS362A	DATA WAREHOUSING AND DATA MINING LAB	1
8	ETCA365A	LINUX ENVIRONMENT LAB	1
9	ETCA367A	PRACTICAL TRAINING	1
Semester VI (EVEN)			
1	ETCS314A	MOBILE COMPUTING	4
2	ETCA324A	NET FRAMEWORK	4
3	ETCS 202A	SOFTWARE ENGINEERING	4
4	ETCS422A	CLOUD COMPUTING	4
5	ETCA364A	NET FRAMEWORK LAB	1
7	ETCA362A	CLOUD COMPUTING LAB	1
8	ETCA368A	MAJOR PROJECT	3
9	ETCA 330A	NETWORK SECURITY & CRYPTOGRAPHY	4
10	ETCA372A	NETWORK SECURITY & CRYPTOGRAPHY LAB	1