

Study & Evaluation Scheme

of

Bachelor of Science (Honours)-Computer Science

[Applicable for the Batch 2017-18]



**COLLEGE OF COMPUTING SCIENCES &
INFORMATION TECHNOLOGY**

TEERTHANKER MAHAVEER UNIVERSITY

Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)

Study & Evaluation Scheme

Of

Bachelor of Science (Honours)-Computer Science SUMMARY



Programme	: B.Sc.(Hons.) - Computer Science
Duration	: Three years full time (six semesters)
Medium	: English
Minimum Required Attendance	: 75%
Maximum Credits	: 175
Minimum Credits required for the degree:	169

Assessment	:	<table border="1"><thead><tr><th>Internal</th><th>External</th><th>Total</th></tr></thead><tbody><tr><td>40</td><td>60</td><td>100</td></tr></tbody></table>	Internal	External	Total	40	60	100
Internal	External	Total						
40	60	100						

Internal Evaluation (Theory Papers):

Class Test I	Class Test II	Class Test III	Attendance	Assignment	Total
Best two Out of the three					
10	10	10	10	10	40

Evaluation of Practical/Dissertations & Project Reports:

Internal	External	Total
50	50	100

Duration of Examination :

External	Internal
3 hrs.	1.5hrs.

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester examination and teachers continuous evaluation. (i.e. both internal and external). A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have secured at least 45% marks in aggregate to clear the semester.

Question Paper Structure

1. The question paper shall consist of 6 questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weight age 2 marks each).
2. Out of the remaining five questions, The long answer pattern will have internal choice with unit wise questions with internal choice in each unit. In units having numerical, weight age and information should be available both in the syllabus and the paper pattern. The weight age of Question No. 2 to 6 shall be 10 marks each.

Internal Evaluation (50 marks)

The Internal evaluation would also be done by the Internal Examiner based on the experiment performed during the internal examination

EXPERIMENT (30 MARKS)	ATTENDANCE (10 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
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External Evaluation (50 marks)

The external evaluation would also be done by the External Examiner based on the experiment performed during the external examination.

EXPERIMENT (30 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Study & Evaluation Scheme
B.Sc. (Honours) Computer Science
Semester-I

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC101	Computer Fundamentals, Internet, & MS-Office	4	1	0	5	40	60	100
2	CSC 103	Digital System Design	4	1	0	5	40	60	100
3	CSC149	English Communication & Soft Skills-I	3	0	2	4	40	60	100
4	CSC 106	Environmental Studies	4	0	0	4	40	60	100
Elective (Select any one)									
5	CSC 107	Managerial Economics	4	0	0	4	40	60	100
	CSC 108 /BCA 111	Mind Management & Human Values							
6	CSC154	Computer Fundamentals, Internet, & MS-Office Lab	0	0	6	3	50	50	100
7	CSC 155	Digital System Design Lab	0	0	4	2	50	50	100
Total			19	2	12	27	300	400	700

Semester-II

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
Elective (Select any one)									
1	CSC 201	Computer Organization	4	1	0	5	40	60	100
	CSC 206	Circuit Theory & Basic Electronics							
2	CSC202	Programming in C	4	1	0	5	40	60	100
Elective (Select any one)									
3	CSC 207	Discrete Mathematics	4	1	0	5	40	60	100
	CSC 208	Graph Theory							
4	CSC 209	Operating System Concepts using Linux	4	1	0	5	40	60	100
5	CSC249	English Communication & Soft Skills-II	3	0	2	4	40	60	100
6	CSC251	Software Lab : C-Programming Lab	0	0	6	3	50	50	100
7	CSC 252	Hardware Lab : Digital	0	0	4	2	50	50	100
Total			19	4	12	29	300	400	700

Semester-III

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC301	Software Engineering and UML	4	1	0	5	40	60	100
2	CSC307	Data Structures Using C	4	1	0	5	40	60	100
3	CSC 349	English Communication & Soft Skills-III	3	0	2	4	40	60	100
4	CSC308	Theory of Data Base Management System	4	1	0	5	40	60	100
5	CSC309	Computer Network	4	1	0	5	40	60	100
6	CSC351	Data Structure Lab	0	0	6	3	50	50	100
7	CSC353	Data Base Management System Lab	0	0	4	2	50	50	100
Total			19	4	12	29	300	400	700

Semester-IV

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC402	Object-Oriented Programming Concepts – C++	4	1	0	5	40	60	100
2	CSC403	Algorithm Design	4	1	0	5	40	60	100
3	CSC406	Formal language and Automata Theory	4	1	0	5	40	60	100
Elective (Select any one)									
4	CSC407	Concepts of IOT(Internet of Things)	4	1	0	5	40	60	100
	CSC408	Scientific Computing							
	CSC409	Ethical Hacking Fundamentals							
	CSC410	Mobile Device and Network Architecture							
5	CSC 449	English Communication & Soft Skills-IV	3	0	2	4	40	60	100
6	CSC452	Object Oriented Programming Lab through C++	0	0	6	3	50	50	100
7	CSC454	Algorithm Design Lab	0	0	4	2	50	50	100
Total			19	4	12	29	300	400	700

Semester-V

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	CSC501	Numerical and Optimizing Techniques	4	1	0	5	40	60	100
2	CSC502	Computer Graphics	4	1	0	5	40	60	100
*Elective (Select any one)									
3	CSC503	Microprocessor	4	1	0	5	40	60	100
	CSC504	Compiler Design							
4	CSC506	Core Java	4	1	0	5	40	60	100
5	CSC507	C#.Net	4	1	0	5	40	60	100
6	CSC553	Core Java Lab	0	0	6	3	50	50	100
7	CSC554	C#.Net Lab	0	0	6	3	50	50	100
Total			20	5	12	31	300	400	700

Semester-VI

S. No.	Category (Core & Non-core)	Course Code	Subject	Periods			Credit	Evaluation Scheme		
				L	T	P		Internal	External	Total
1	CORE	CSC603	Mobile Computing	3	1	0	4	40	60	100
2	NON CORE	CSC605	Digital Image Processing	3	1	0	4	40	60	100
Elective (Select any one)										
3	NON CORE	CSC617	Artificial Intelligence	3	1	0	4	40	60	100
		CSC607	Embedded System							
		CSC608	Distributed Computing							
*Elective (Select any one)										
4	CORE	CSC609	Advance Java	4	1	0	5	40	60	100
		CSC610	ASP.Net with Ajax							
5	CORE	CSC616	Cloud Computing	4	1	0	5	40	60	100
Elective (Select any one)										
6	NON CORE	CSC611	Concept of Green Technology	3	1	0	4	40	60	100
		CSC612	Social Implications of Information technology							
		CSC613	Information Security and Cyber Law							
		CSC614	Enterprise Resource Planning system							
		CSC615	Big Data Analytics							
7	CORE	CSC653	Project Lab-Under the Super vision of Project Guide(In house Development)	0	0	4	2	50	50	100
*Elective (Select any one)										
8	CORE	CSC655	Advance Java Lab	0	0	4	2	50	50	100
		CSC656	ASP.Net with Ajax Lab							
Total				20	6	8	30	340	460	800

**B.Sc. (Honours) Computer Science -Semester I
Computer Fundamentals, Internet, & MS-Office**

Course Code: CSC101

L-4, T-1, P-0, C-5

Objective: To give the basic knowledge of Computer hardware and application software with DOS keys and basic introduction of C programming language to the students.

Course Contents

Unit I:

Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional components of a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, Bar Code Reader b) Output Devices – Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD, ASCII and EBCDIC Codes. **(Lecture08)**

Unit II:

MS – DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR(CD),CLS, COPY, DATE, DEL(ERASE), DIR, CHARACTER, EXIT,MKDIR(MD), REM, RENAME(REN), RMDIR(RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT,HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT,XCOPY. **(Lecture 08)**

Unit III:

MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge. **(Lecture 08)**

Unit IV:

MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping , Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets.

MS Power Point: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS – Access: creating table and database. **(Lecture 08)**

Unit V:

C Programming: Variables, Constants, Keywords and Identifiers, Operators and Expression, Type Conversion, Arithmetic Expression, Logical Expression Operator Precedence, Sequencing, Applying if statement, if.....else statements, nested if.....else and else if ladder statements. Program Loops and Iteration: Use of Loops (while, do and for), Nested Loops. **(Lecture 08)**

Course outcomes:

After studying this course, you should be able to:

- understand what all the terms highlighted in bold in the text mean

- understand the fundamental hardware components that make up a computer's hardware and the role of each of these components
- understand the difference between an operating system and an application program, and what each is used for in a computer
- describe some examples of computers and state the effect that the use of computer technology has had on some common products
- Identify the principal components of a given computer system and draw a diagram after the style of Figures 6 and 12 to represent the data flows between them.

Text Books:

1. Sinha P.K., Computer Fundamentals, BPB Publishing.
2. Bill Bruck., The Essentials Office 2000 Book, BPB Publishing.
3. KanitkarYashwant, Let Us C, BPB Publishing.

Reference Books:

1. Leon A. & Leon M., Introductions to Computers, Vikas Publications.
2. Balaguruswamy E., Programming in ANSI C, Tata McGraw Hill.
3. Peter Norton_s, Introductions to Computers, Tata McGraw Hill.

***Latest editions of all the suggested books are recommended.**

B.Sc. (Honours) Computer Science -Semester I
Digital System Design

Course Code: CSC103

L-4, T-1, P-0, C-5

Objective: This subject provides students an in–depth theoretical base of the Digital Electronics, the fundamental designing concepts of different types of Logic Gates, Minimization techniques and the computational details for Digital Circuits.

Course Contents

Unit I:

Introduction to Digital Design: Digital System, Specification and Implementation of digital design, Digital Computer, Review of number systems, Number base conversions, Binary Addition and Subtraction, floating point representation of numbers, Error detecting and Correcting Codes. **(Lecture 08)**

Unit II:

Boolean algebra: Fundamentals of Boolean algebra, Laws of Boolean Algebra, switching function and Boolean function, Demorgan’s Theorem, Truth Table, Sum of Products (SOP), Product of Sum (POS), Minterm, Maxterm, Don’t care condition, Simplification of Boolean Functions - Karnaugh Map (two, three, four and five variable K-map), Tabular method, Logic Gates- AND, OR, NOT, NAND, NOR, Universal Gates, Exclusive-OR (Ex-OR) Gate, Exclusive-NOR (Ex-NOR) Gate, Multilevel Gating Networks. **(Lecture 08)**

Unit III:

Combinational Circuits: Design procedure of Combinational Circuits, Adders, Subtractor, Design of Comparators, Decoders, De-multiplexers, Data selectors/multiplexer, Encoder, Seven segment display unit, Multiplexed display, Keyboard encoder, Combinational Logic Optimization’s and Tradeoff’s. **(Lecture 08)**

Unit IV:

Sequential Circuits: Introduction, Flip-Flop (1 bit) SR, JK, D, T ,Conversion of flip flops, Shift Register, Counter, Synchronous Sequential Circuits(SSC), SSC Design using Algorithmic State Machine (ASM). **(Lecture 08)**

Unit V:

Asynchronous Sequential Circuits, Problems in Asynchronous Circuits, Finite State Machines (FSM) and Controller, Sequential Logic Optimization and Tradeoff’s, Basic ladder circuits, ROM & PLA (basic idea). **(Lecture 08)**

Course Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:

1. An ability to describe, design, simulate, and synthesize computer hardware using the Verilog hardware description language.
2. An ability to rapidly design combinational and sequential logic that works.
3. An ability to rapidly design complex state machines (present in all practical computers) that work.
4. An ability to synthesize logic and state machines using an Automatic Logic Synthesis program.
5. An ability to implement state machines using Field-Programmable Gate Arrays.
6. An ability to design high-speed computer arithmetic circuits.
7. An ability to design a computer to be fault-tolerant.
8. An ability to design a computer memory using error-correcting codes.
9. An ability to design a computer so that it can test itself with built-in circuitry.

Text Books:

1. S Salivahanan, “Digital Circuits and Design”, Vikas Publication
2. M. Morris Mano, “Digital Logic and Computer Design”

Reference Books:

1. Mark Balch, “Complete Digital Design”, Mc-Graw Hill
2. Frank Vahid, “Digital Design”, John Wiley Sons Publishers

***Latest editions of all the suggested books are recommended.**

B.Sc. (Honours) Computer Science -Semester I
English Communication & Soft Skills– I

Course Code: BCA149, CSC149, BSA149

L T P C
3 0 2 4

Objective: To make students able to express their views in simple and correct sentences by using linguistic and grammatical devices.

Course Content:

Unit -1 Introduction to English Language (06 hours)

- a) Importance of English Language in the present scenario
- b) International Phonetic Alphabet: Consonant and Vowel Sounds
- c) Syllable, Word Stress and Intonation
- d) Rules of Spelling and Pronunciation
- e) Self Introduction and Introducing Others

Classroom Activity: (04 Hours)

Listening: Making the students listen the words of English properly from their teacher and other sources

Speaking: Drills on Word Stress and Intonation, Proper pronunciation of the given words and Conversation Practice

Reading: Making the students read the words of English from the given text

Writing: Making the students write the words of English dictated by their teacher

Unit -2 Basics of Grammar (06 hours)

- a) Parts of Speech: Noun and its kinds, Pronoun and its kinds, Adjective and its kinds, Verb and its kinds, Adverb and its kinds, Preposition and its kinds, Conjunction and its kinds and Interjection
- b) Subject and Predicate
- c) Basic Sentence Pattern: Subject, Verb, Object, Adverbial, Adjunct and Complement

Classroom Activity: (04 Hours)

Speaking: Enabling the students speak out sentences by using the given parts of speech

Reading: Making the students identify different parts of speech in sentences

Writing: Asking the students do exercises on Parts of Speech, Subject-Predicate and Basic Sentence Patterns

Unit -3 Functional Grammar (06 hours)

- a. Number: Singular and Plural; Person: First, Second and Third; Case: Nominative, Possessive and Objective
- b. Tense: Present, Past and Future
- c. Voice: Active and Passive
- d. Subject-Verb Agreement

Classroom Activity: (04 Hours)

Speaking: Enabling the students speak out sentences in different kinds of tense and voice

Reading: Making the students read and identify different kinds of tense and voice

Writing: Making the students write correct sentences

Unit -4 Comprehension Skills (06 hours)

- a. Role of Listening

- b. Reading Comprehension
- c. Reasons for poor comprehension
- d. Improving comprehension skills
- e. Reading Passages from daily News Paper and Short Stories
- f. Writing Short Stories with the help of incomplete sentences

Classroom Activity: (04 Hours)

Listening: Involving the students listen to the passage read by their teacher

Speaking: Enabling the students deliver a speech on the given topics

Reading: Asking the students read the passage from daily news paper, short stories, etc.

Writing: Making the students answer the questions based on the passage given to them

Text Books:

1. Balasubramanian T., *A Textbook of English Phonetics for Indian Students*, Macmillan India Ltd., Madras. 1995.
2. Nesfield J.C., *English Grammar Composition & Usage*, Macmillan Publishers.
3. Hornby A.S., *Guide to Patterns & Usage in English*, Oxford University Press, New Delhi.
4. Allen W. S., *Living English Structure*, Pearson Publication, New Delhi.
5. Allen W. S., *Living English Speech*, Orient Longman, New Delhi.
6. Wood F. T., *A Remedial English Grammar for Foreign Students*, Macmillan India Ltd., Chennai, 1965.

Reference Books:

1. Taylor Grant, *English Conversation Practice*, Tata McGraw Hill New Delhi.
2. Martin & Wren - *High School English Grammar & Composition*, S.Chand & Co. New Delhi.
3. Arora V.N. & Chandra Lakshmi, *Improve Your Writing*, OUP, Chennai. 2000.
4. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
5. Hornby A.S., *Oxford Advanced Learners Dictionary of Current English*, 7th Edition.
6. McCarthy, Michael, *English Vocabulary in Use*, Cambridge University Press.

Learning Outcome:

1. Students will be able to learn the basics of English language.
2. They will be able to write and speak.
3. They will be able to give presentation from the podium.
4. They will be able to speak in English on current issues.
5. They will be able to improve their vocabulary through comprehension.

*Latest edition available of all books

B.Sc. (Honours) Computer Science -Semester I
Environmental Studies

Course Code: CSC106

L-4, T-0, P-0, C-4

Objective: To create awareness among students about environment protection.

CourseContent:

Unit I

(Lectures 08)

Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development.

Ecology andEnvironment: Concept of an Ecosystem-its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.

Unit II

(Lectures 08)

Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; Land degradation, Soil erosion & desertification. **Deforestation:** Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. **Energy Resources:** Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies.

Biodiversity: Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India

Unit III

(Lectures 08)

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies

Unit IV

(Lectures 08)

Environmental policies & practices: Climate change & Global Warming (Greenhouse Effect), Ozone Layer -Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context

Unit V

(Lectures 08)

Human Communities & Environment:

Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case studies.

Field Work:

1. Visit to an area to document environmental assets; river/forest/flora-fauna etc.
2. Visit to a local polluted site: urban/ rural/industrial/agricultural.
3. Study of common plants, insects, birds & basic principles of identification.
4. Study of simple ecosystem; pond, river etc.

Learning Outcomes:

Based on this course, the Engineering graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

Text Books:

1. "Environmental Chemistry", De, A. K., New Age Publishers Pvt. Ltd.
2. "Introduction to Environmental Engineering and Science", Masters, G. M., Prentice Hall India Pvt. Ltd.
3. "Fundamentals of Ecology", Odum, E. P., W. B. Saunders Co.

Reference Books:

1. "Biodiversity and Conservation", Bryant, P. J., Hypertext Book
2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I.K. Publication

***Latest editions of all the suggested books are recommended.**

**B.Sc. (Honours) Computer Science -Semester I
MANAGERIAL ECONOMICS**

Course Code: CSC107

L-4, T-0, P-0, C-4

Objective: The objective of this course is to develop basic understanding about the economic concepts, tools and techniques for their affiliation business decisions.

Course Contents:

Unit I

Introduction: Nature, scope and relevance of managerial economics is business decisions; Fundamental economic concept – scarcity of resources, opportunity cost, incremental principle, micro v/s macro economics. **(Lecture 8)**

Unit II

Demand and Supply Analysis: Demand function meaning, types and determinants, law of demand; Elasticity of demand – meaning, types and its measurement, Supply function – meaning and its determinants; law of supply. **(Lecture 8)**

Unit III

Consumer Behaviour: Utility analysis and indifference curve analysis; Demand forecasting – its significance and techniques. **(Lecture 8)**

Unit IV

Production and Cost Analysis: Production – factors of production, fixed and variable inputs, law of variable proportions; law of returns to scale, economies and diseconomies of scale. **(Lecture 8)**

Unit V

Market Structures and Price Determination: Different market structures and their characteristics, monopolistic competition, monopoly and oligopoly. **(Lecture 8)**

Courseoutcomes:

By the end of this class, participants should be able to:

- **Identify** sources of economic value
- **Create** new market opportunities through differentiation and alternative approaches
- **Understand** the mechanisms of competition and their business implications
- **Anticipate** future market trends and dynamics, including in terms of competition policy
- **Engineer** futures that are more congruent with their interests
- **Develop** a long-term, consistent strategy and vision, beyond mere day-to-day tactic

Text Books:

1. Dwivedi, D N, Managerial Economics, Vikas Publishing House, New Delhi.
2. Mehta, P L, Managerial Economics, S. Chand , New Delhi.
3. Chaturvedi, D D, & Gupta, S L, Business Economics, Brijwasi Publishers.

Reference Books:

1. Mehta P. L., Managerial Economics, S. Chand , New Delhi.
2. Koutsoyiannis, A., Modern Micro Economics, Macmillan Press Ltd,
3. Salvator, Dominick, Managerial Economic, McGraw – Hill Book Company.

***Latest editions of all the suggested books are recommended.**

**B.Sc. (Honours) Computer Science -Semester I
Mind Management & Human Values**

Course Code: CSC108/BCA111

L-4, T-0, P-0, C-4

Objective: To help the students to discriminate between valuable and superficial in their life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life - this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability, it is important to act on such discrimination in a given situation.

Course Contents

Unit - I

Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education, Self Exploration-what is it?- its content and process; „Natural Acceptance□ and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels. **(Lecture 08)**

Unit - II

Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self („I□) and „Body□ - *SukhandSuvridha* , Understanding the Body as an instrument of „I□ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure *Sanyam* and *Swasthya*. **(Lecture 08)**

Unit - III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship. Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitvaas* comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!. **(Lecture 08)**

Unit - IV

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature, Understanding Existence as Co-

existence (*Sah-astitva*) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence. **(Lecture 08)**

Unit - V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems. **(Lecture 08)**

Course outcomes:

- Communicate effectively.
- Make effective presentations.
- Write different types of reports.
- Face interview & group discussion.
- Critically think on a particular problem.
- Solve problems.
- Work in Group & Teams
- Handle Engineering Ethics and Human Values.
- Become an effective leader.

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, *A Foundation Course in Value Education*.

Reference Books:

1. Ivan Illich, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA.
2. E.F. Schumacher, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain. ANagraj, 1998, *JeevanVidyaekParichay*, Divya Path Sansthan, Amarkantak.
3. Sussan George, *How the Other Half Dies*, Penguin Press.
4. PL Dhar, RR Gaur, *Science and Humanism*, Commonwealth Purblishers.
5. A.N. Tripathy, *Human Values*, New Age International Publishers.
6. SubhasPalekar, *How to practice Natural Farming*, Pracheen(Vaidik) KrishiTantraShodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, *Limits to Growth – Club of Rome’s report*, Universe Books.
8. E G Seebauer& Robert L. Berry, *Fundamentals of Ethics for Scientists & Engineers*, Oxford University Press.
9. M Govindrajran, S Natrajan& V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd.

***Latest editions of all the suggested books are recommended.**

**B.Sc. (Honours) Computer Science -Semester I
Computer Fundamentals,Internet, & MS-Office Lab**

Course Code CSC154

L-0, T-0, P-6, C-3

Course Content

C programming: Core Concepts of programming on Data types, simple arithmetic and logical operation. Decision control, Iteration control, Sequencing, and case control.

MS Office:

MS-WORD

Creating, Editing, Formatting: Font name, size, color, alignment, changing, paragraph settings, change case, spell checker, Mail Merge, Creating Tables, editing tables, alignment settings in tables

MS-EXCEL

Creating, Editing, Formatting: font name, size, color, alignment, changing, entering data, Sorting Data, Inserting, renaming and deleting Sheet, Inserting row, column, cell ,picture, background, graph, symbol, hyperlink ,object, diagram.

MS-POWERPOINT

Creating, Editing, Formatting: font name, size, color, alignment, changing, Inserting table, picture, background, graph, symbol, hyperlink, object, diagram.

MS-ACCESS

Creating database and editing data base

Course Outcomes:

- Student will develop a vocabulary of key terms related to the computer and to software program menus
- Student will be able to identify the components of a personal computer system
- Student will be able to demonstrate mouse and keyboard functions
- Student will be able to demonstrate window and menu commands and how they are used
- Student will be able to demonstrate how to organize files and documents on a USB/hard drive
- Student will be able to compose, format and edit a word document
- Student will be able to send email messages (with or without attachments)
- Student will be able to navigate and search through the internet
- Student will be able to navigate through Web

Course Content

1. Design a full-subtractor using a suitable MUX.
2. Design a 2x4 decoder using NAND gates only.
3. Design proper logic circuits to prove that a NOR gate is a universal gate.
4. Design a logic circuit to convert a 2-bit binary number to excess 3 code.
5. Design a circuit to check whether two 4-bit binary numbers are equal or not.
6. Design an XOR gate using NAND gates only.
7. Design an 4x1 MUX using basic logic gates.
8. Design a 4-bit adder-subtractor using IC-7483 and other suitable logic gate(s).
9. Design a 3 bit binary code to gray code converter.
10. Design a full-adder using suitable MUX.
11. Design proper logic circuits to prove that a NAND gate is a universal gate.
12. Realize the following Boolean function using suitable MUX:- $f(A,B,C)=\Pi(0,1,3)$
13. Design a 1-bit magnitude comparator using NAND gates only.
14. Design a 3-bit gray code to binary code converter.
15. Design a half-adder and a half-subtractor using basic logic gates.
16. Design a 2x4 decoder using NAND gate only.
17. Design proper logic circuits to prove that NOR gate is an universal gate.
18. Design a half-adder using NAND gates.
19. Design a full-adder using suitable MUX.
20. Design a logic circuit to convert a 3-bit binary to excess 3 code.
21. Design a circuit to check whether two 4-bit binary numbers are equal or not.
22. Design a 2x4 decoder using NAND gate only.
23. Design a full-subtractor using suitable MUX.
24. Design a circuit for a 2-line to 4 line de-multiplexer using NAND gate.
25. Design a BCD to excess-3 code converter.
26. Obtain the NAND logic diagram of a full-adder from the Boolean function.
27. Design and implement a 4-bit 2's complement adder/subtractor.
28. Design a full-subtractor using NAND gates.
29. Design a circuit with four inputs and one output, such that the output goes to '1' whenever two or more of inputs are '1'. For other cases the output remains at '0'.

Course Outcomes:

- Students will be able to contrast and compare digital representation of information with the analog representation.
- Will to able to explain fundamental concepts of the decimal number system.
Represent number systems in powers of the base.
- Will understand the fundamentals of converting from one number system to another.
- Will be able to count, convert among, and do arithmetic in the binary, hexadecimal and octal number systems.
- Will be able to represent signed decimal numbers in 2's complement form, and vice versa.
- Will be able to represent data in codes and interpret those codes.
- Will be able to demonstrate how voltage levels are used to represent digital quantities and describe various parameters of a pulse waveform.

- Will be able to explain the basic logic operations of NOT, AND, OR, NAND, NOR, and XOR.
- Will be able to interpret logic functions, circuits, truth tables, and Boolean algebra expressions.
- Will be able to apply the laws of Boolean algebra to simplify circuits and Boolean algebra expressions.
- Will be able to use the methods of systematic reduction of Boolean algebra expressions including Karnaugh maps.
- Will understand the basic electronics of logic circuits and be able to use integrated circuit packages.
- Will be able to model, analyze, and test a digital circuit using a computer software application.

B.Sc. (Honours) Computer Science -Semester II
Computer Organization

Course Code: CSC201

L-4, T-1, P-0, C-5

Objective:

To have a thorough understanding of the basic structure and operation of a digital computer.

To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.

To study the different ways of communicating with I/O devices and standard I/O interfaces.

To study the hierarchical memory system including cache memories and virtual memory

UNIT -I:

Basic Building Blocks and Circuit Design: Arithmetic circuits; flip-flops; encoder, decoder, multiplexer, de multiplexer circuits.

Shift registers, Register with parallel load, Register transfer and Micro-operations: Register Transfer Language, Bus and memory. Transfers, Arithmetic. Logic Micro-operations, Shift Micro-operations

(Lecture 08)

UNIT-II:

Basic Computer Organization and Design: Instruction and instructions Codes, Computer instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupts; Complete Computer Description.

(Lecture 08)

UNIT-III:

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data and Transfer Manipulation, Program Control.

(Lecture 08)

UNIT-IV:Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division algorithm, Floating-Point Arithmetic Operations, decimal arithmetic Unit, Decimal Arithmetic Operations.

(Lecture 08)

UNIT-V:

Input-Output Organization: Peripheral Devices, Input-Output interface, Asynchronous Data Transfer, Modes of transfer, Priority interrupt, Direct Memory Access(DMA), input-output processors(IOP), serial communication multi-processors, characteristics of multi-processors, Inter-connection structures. Inter-processor Arbitration, Inter-processor Communication and Synchronization, cache memory, Cache Coherence.

(Lecture 08)

Course Outcome:

- Structure and function of digital computers, operating systems and basic assembly language programming.
- Ability to analyze and model the structure and functioning of a digital computer, including overall system architecture, operating system, and digital components.
- Identify the hardware components of a computer system and explain how machine instructions and the data they operate on are represented, stored, and executed.
- Explain the generic principles that underlie the building of a digital computer, including data representation, digital logic and processor programming.

Text Books:

1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI
2. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.

Reference Books:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson.
3. Fundamentals of Computer Organization and Design, - SivaramaDandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth.
5. Edition Elsevier Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS.

***Latest editions of all the suggested books are recommended.**

B.Sc. (Honours) Computer Science -Semester II
Circuit Theory & Basic Electronics

Course Code: CSC206

L-4, T-1, P-0, C-5

Objectives: Understanding the various methods for analysis and synthesis of electrical networks. Design and set up of simple analog filter circuits

Course Contents

Unit I:

Passive circuit: parameters, Kirchoff's law, impedance and reactance, superposition, reciprocity, Thevenin, Norton, maximum power transfer.

LCR Circuits: Resonance, Natural frequency, Damping, Bandwidth, Q factor, Series RLC circuit: Transient response, Overdamped Response, Underdamped Response, Critically Damped Response. **(Lecture 08)**

Unit II

Semiconductor Diodes: Semiconductor materials- intrinsic and extrinsic types, Ideal Diode, Terminal characteristics of diodes: p-n junction under open circuit condition, p-n junction under forward bias and reverse bias conditions, p-n junction in breakdown region, Diode small signal model, Zener diode and applications. **(Lecture 08)**

Unit III

Bipolar Junction Transistors (BJTs): Physical structure and operation modes, Active region operation of transistor, Transistor as an amplifier, Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias, Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers, Transistor as a switch: cut-off and saturation modes. **(Lecture 08)**

Unit IV

Field Effect Transistor (FET): Enhancement-type MOSFET: structure and physical operation, current-voltage characteristics, Depletion-type MOSFET, D.C. operation of MOSFET circuits, MOSFET as an amplifier, Biasing in MOSFET amplifiers, Basic MOSFET amplifier configuration: common source, common gate and common drain types.

Junction Field-Effect Transistor (JFET): structure and physical operation, current-voltage characteristics. **(Lecture 08)**

Unit V

Operation Amplifier (Op-amps): Ideal Op-amp, Differential amplifier: differential and common mode operation, common mode rejection ratio (CMRR), Practical op-amp circuits: inverting amplifier, non-inverting amplifier, integrator, differentiator, logarithmic amplifiers, waveform generators, Schmitt triggers, comparators.

(Lecture 08)

Course Outcomes:

- Students will be able to explain basic circuit concepts and responses.
- Will be able to do linear modeling of passive elements and sources.
- Will be able to use analytical techniques in resistive circuits energized by direct current voltage and current sources.
- Will be able to evaluate lecture material with circuit simulation software and laboratory bench experiments.
- Will be able to explain the concept of capacitance and inductance and the concept of two-terminal linear devices.
- Will be able to evaluate of R-L-C dc circuits.

Text Books:

1. Theory Of Electronics: V.K.Mehta

2. Electronic Devices and Circuit Theory :Robert L. Boylestad,LouisNashelsky
3. Electronics Circuits, Amplifiers and Gates. : D.V. Bugg,AdamHilger

Reference Books:

1. Basic Electronics for Scientists.: J. Brophy,McGraw Hill
2. Electromagnetism - Principles and Applications. : Lorrain and Corson Freeman
3. Integrated electronics: Analog and digital circuits and systems. MillimanHalikias

***Latest editions of all the suggested books are recommended.**

Objective:

The objective of this course module is to provide the sound knowledge of C programming. It facilitates the student to develop programming capability to design programs as well as real life applications using C language. It also covers the concept of core programming like how to implement functions, arrays and how to manage data in files using different file operations.

Course Content

Unit I

Introduction: Flow charts, Tracing flow charts, Problem solving methods, Need for computer Languages, Sample Programs written in C, C character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic constants, Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment, conditional operators, comma operators. **(Lecture 08)**

Unit II

Control statements: While, do-while, for statements, nested loops, if else, switch, break, Continue, and goto statements, Storage types: Automatic, external, register and static variables. **(Lecture 08)**

Unit III

Functions: Defining and accessing, passing arguments, Function prototypes, Recursion, Library functions, Static functions Arrays: Defining and processing, Passing arrays to a function, Multi dimensional arrays. Strings: Defining and operations on strings. **(Lecture 08)**

Unit IV

Pointers: Declarations, Passing pointers to a function, Operations on pointers, Pointer Arithmetic, Pointers and arrays, Arrays of pointers function pointers. Structures: Defining and processing, Passing to a function, Unions, typedef, array of structure, and pointer to structure. **(Lecture 08)**

Unit V

File structures: Definitions, concept of record, file operations: Storing, creating, retrieving, updating Sequential, relative, indexed and random access mode, Files with binary mode (Low level), performance of Sequential Files. **(Lecture 08)**

Course Outcomes:

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers.
- Use different data structures and create/update basic data files.

Text Books:

1. "Problem Solving and Program Design in C", Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley.
2. "ANSI C", E. Balaguruswamy.

References Books:

1. "Schaum Series – Programming in C", TMH publication
2. "Let us C", Yashvant Kanitkar
3. "Computer Concepts with Programming in C", Forouzan
4. "Computer Concepts & Programming in C", Amit Kumar Mishra – Katson Books

***Latest editions of all the suggested books are recommended.**

B.Sc. (Honours) Computer Science -Semester II
Discrete Mathematics

Course Code: CSC 207

L-4,T-1,P-0,C-5

Objectives:

Students will be able to explain and apply the basic methods of discrete (non-continuous) mathematics in Computer Science. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.

Course Content:

Unit I:

Counting Theory:

Pigeon Hole Principle, Permutations and Combinations, Recurrence Relation, Generating Function Principle of mathematical induction. **(Lecture 08)**

Unit II:

Graphs: Definition, Finite and Infinite graphs. Directed and undirected graphs, Degree, Isolated vertex, Pendant vertex Null graphs.

Walks: Paths and circuits. Connected and disconnected graphs, Euler's graphs, Hamiltonian paths and circuits. **(Lecture 08)**

Unit III:

Trees: Definition and basic properties, Distance and contents. Matrix representation of graphs Incidence, Adjacency and Circuit matrices.

Graph Search: BFS, DFS, Spanning Trees, Shortest Path Problems. **(Lecture 08)**

Unit IV:

Introduction to probability: Probability Axioms, Law of Total Probability, Conditional Probability Bayes Rule, Probability Density Functions and Probability Mass Functions, Conditional probability, Binomial, Poisson and normal distributions. **(Lecture 08)**

Unit V:

Set Theory: Sets, subsets, union, intersection, Venn diagrams. Relations as a subset of a product.

Functions: Functions and partial functions.

Relation: Equivalence Relation, Binary relations. Relations on a set. Reflexive, symmetric and transitive properties of a relation on a set. **(Lecture 08)**

Course Outcomes:

On completion of the module the student should:

- Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
- Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
- Be able to use effectively algebraic techniques to analyse basic discrete structures and algorithms.
- Understand asymptotic notation, its significance, and be able to use it to analyse asymptotic performance for some basic algorithmic examples.
- Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

Text Books:

1. Swapan Kumar Sarkar “Discrete Mathematics”, - S Chand
2. NarsinghDeo, “Graph Theory with Applications to Engineering and Computer Science”, Prentice Hall of India.
3. Seymour Lipschutz and Marc Lipson, “Discrete Mathematics”, SchaumOutlineseries – TataMcGraw Hill

Reference Books:

1. Liu C.L., “Elements of Discrete Mathematics”
2. Neville Dean, “Essence of Discrete Mathematics Prentice Hall”

***Latest editions of all the suggested books are recommended.**

B.Sc. (Honours) Computer Science -Semester II
Graph Theory

Course Code: CSC 208

L-4,T-1,P-0,C-5

Objective:

The two main objectives of the course are

- (1) to make students familiar with the most fundamental Graph Theory topics and results;
- (2) to teach the students the techniques of proofs and analysis.

Unit I:

Graphs :Introduction, Isomorphism, Sub graphs , Walks, Paths, Circuits, Connectedness, Components, Euler Graphs , Hamiltonian Paths and Circuits , Trees , Properties of trees , Distance and Centers in Tree , Rooted and Binary Trees. (Lecture 08)

Unit II:

Spanning trees :Fundamental Circuits ,Spanning Trees in a Weighted Graph , Cut Sets , Properties of Cut Set , All Cut Sets , Fundamental Circuits and Cut Sets , Connectivity and Separability

Algorithms: Connectedness and Components , Spanning tree , Finding all Spanning Trees of a Graph., Planer Graphs , Different Representation of a Planer Graph.. (Lecture 08)

Unit III:

Incidence matrix ,Sub matrices, Circuit Matrix , Path Matrix , Adjacency Matrix , Directed Graphs , Types of Directed Graphs , Digraphs and Binary Relations , Directed Paths and Connectedness , Euler Graphs , Adjacency Matrix of a Digraph (Lecture 08)

Unit IV:

Chromatic number, Chromatic partitioning, Chromatic polynomial, Matching, Covering, Four color problem, Five color problem. (Lecture 08)

Unit V:

Generating functions: Exponential generating function, Summation operator,

Recurrence relations: First order and second order, Non-homogeneous recurrence relations, solve recurrence relations generating functions. (Lecture 08)

Course Outcomes:

On successful completion of the course students will be:

1. To formulate problems in terms of graphs, solve graph theoretic problems.
2. To learn the mathematical manipulation of counting problems.
3. To use generating functions to solve a variety of combinatorial problems.
4. To learn the techniques of proof and analysis.

Text Books:

1. NarsinghDeo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India.
2. Chartrand Zhang: Introduction to Graph Theory, TMH.

Reference Books:

1. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill.
2. GeirAgnarsson& Raymond Geenlaw: Graph Theory, Pearson Education.

B.Sc. (Honours) Computer Science -Semester II
Operating System Concepts using Linux

Course Code:CSC209

L-4, T-1, P-0, C-5

Objectives:

1. To Understand the concept of process, and thread management
2. To Understand how the resources are scheduled and managed
3. To Understand the concepts of process synchronization and deadlock
4. To know the concept of I/O and File management
5. To Understand various Memory management techniques

Unit I:

Basics of Operating Systems:

Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems: Desktop, Multiprocessor, Distributed, Clustered, Multiprogramming, Real time, Embedded and Time sharing.

Operating System Components: Process Management component - Memory Management component - I/O Management component – File Management component - Protection System – Networking management component – Command interpreter.

Operating System Services: Process Execution – I/O operations – File manipulations – Communications – Error detection and recovery – Resource allocation – Accounting – System Protection - System Calls – System call Execution. **.(Lecture 08)**

Unit II:

Processes: Definition – Process Relationship - Process states – Process State transitions - Process Control Block – Context switching – Threads – Concept of multithreads - Benefits of threads – Types of threads

Process Scheduling: Definition – Scheduling objectives – Types of Schedulers – Scheduling criteria – CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) – Scheduling algorithms – Pre-emptive and Non-pre-emptive - FCFS – SJF – RR - Multiprocessor scheduling.

Interprocess Communication and Synchronization: Definition – Shared Memory System – Message passing – Critical section – Mutual Exclusion - Semaphores.

Deadlocks: Definition – Deadlock characteristics – Deadlock Prevention – Deadlock Avoidance – Deadlock detection and Recovery. **(Lecture 08)**

Unit III:

Basic Memory Management: Definition – 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 (Concepts only) – Page Replacement policies – Optimal (OPT), First in First Out (FIFO), Not recently used (NRU) and Least Recently used (LRU) **(Lecture 08)**

Unit IV:

Disk Management: Disk Structure, Disk Scheduling and its algorithms, RAID TECHNOLOGY.

File Management:

File concept – File attributes – Name, Identifier, Type, Location, Size, Time, Date, user identification – File Operations - Directory Structure – Single level, Two level, Tree Structure – Disk space allocation methods– Contiguous, Linked, Indexed. - Access Methods – Sequential, Random access – File system structure – Byte sequence, Record sequence and Tree-based – Disk formatting

Security and Protection: Security threats – Security Policies and Mechanisms – Authentications
(Lecture 08)

Unit V:

Introduction :

History of Linux – Features of Linux - Drawbacks of Linux – Components of Linux - Memory Management Subsystems - Linux Process and Thread Management - File Management System - Device Drivers

Linux Commands and Utilities :

cat, tail, cmp, diff, wc, sort , mkdir, cd, rmdir, pwd, cp, more , passwd, who, whoami, mv, chmod, kill, write, wall, merge , mail, news – pipes, filters and redirection utilities. **(Lecture 08)**

Course Outcomes:

- Will be able to describe and use the LINUX operating system.
- Will be able to describe and use the fundamental LINUX system tools and utilities.
- We will able to describe and write shell scripts in order to perform basic shell programming.
- Will be able to describe and understand the LINUX file system.

Text Books:

1. Operating System - William Stallings Prentice Hall of India, 4th Edition, 2003.
2. Operating System Concepts - Abraham Silberschatz, and James L. Addison Wesley Pub Company
3. Operating system, Principals & Design, Pal Chaudhury, Prentice Hall of India, First Edition.

Reference Books:

1. Introduction to Operating Systems - Harvey M. Deital Addison Wesley Publishing Company
2. Operating Systems – Design and Implementation - Andrew S. Tanenbaum Prentice Hall of India, New Delhi
3. Operating Systems , Concepts and Design - Milan Milenkovic TMGH, 2000, New Delhi
4. Operating Systems – A Concept Based Approach-D.M. Dhamdhare TMGH, 2002,

***Latest editions of all the suggested books are recommended.**

B.Sc. (Honours) Computer Science -Semester II
English Communication & Soft Skills–II

Course Code: BCA249, CSC249, BSA249

L T P C

3 0 2 4

Objective: To make students able to comprehend and express their views in simple and correct sentences.

Course Content:

Unit -1 Sentence Construction

(06 hours)

- a) Finite and Non Finite Verb
- b) Simple, Compound and Complex Sentence
- c) Conditional Sentence
- d) Narration: Direct and Indirect Speech
- e) Modals

Classroom Activity: (04 Hours)

Speaking: Enabling the students speak out simple, compound and complex sentences

Reading: Making the students pick out finite, non finite and modal verbs and comprehend their usage in the given passage

Writing: Enabling the students write different kinds of conditional sentences in direct and indirect speech

Unit -2 Presentation Techniques

(06 hours)

- a) Audience & Locale
- b) Audio-Visual Aids
- c) Organizing Contents
- d) Voice Dynamics
- e) Body Language
- f) Nuances of Speech Delivery

Classroom Activity:

(04 Hours)

Listening: Involving the class listen to the speech delivered by students

Speaking: Enabling the students deliver a speech on different topics with the help of audio-visual aids

Reading: Asking the students read out technical and scientific paper

Writing: Making the students write a speech on current topics

Unit -3 Speaking Skills

(02 hours)

- a) Common Conversation: Situational and Structural
- b) JAM Session (Just a Minute Session) on various topics
- c) Describing a Scene, a Picture and an Event
- d) Extempore Speech

Classroom Activity:

(08 Hours)

Listening: Involving the students listen to the conversation and speech made by their classmates

Speaking: Enabling the students speak on the given scene, picture, event and situation

Writing: Making the students write conversation and speech

Unit -4 Writing Skills

(04 hours)

- a) Principles of Paragraph Writing: Topic Sentence, Unity, Coherence
- b) Methods of Paragraph Writing
- c) Practice of Writing Paragraph
- d) Writing Application for Different Purposes

Classroom Activity:

(06 Hours)

Writing: Making the students write paragraph and application for different purposes

Text Books:

1. Nesfield J.C., *English Grammar Composition & Usage*, Macmillan Publishers.
2. Hornby A.S., *Guide to Patterns & Usage in English*, Oxford University Press, New Delhi.
3. Allen W. S., *Living English Structure*, Pearson Publication, New Delhi.
4. Allen W. S., *Living English Speech*, Orient Longman, New Delhi.
5. Taylor Grant, *English Conversation Practice*, Tata McGraw Hill New Delhi.

Reference Books:

1. Thomson A. J. & Martinet A. V., *A Practical. English. Grammar*, Oxford University Press, New Delhi.
2. Martin & Wren - *High School English Grammar & Composition*, S.Chand & Co. New Delhi.
3. Hornby A.S., *Oxford Advanced Learners Dictionary of Current English*, 7th Edition.
4. McCarthy, Michael, *English Vocabulary in Use*, Cambridge University Press.
5. Wood F. T., *A Remedial English Grammar for Foreign Students*, Macmillan India Ltd., Chennai, 1965.

Learning Outcome:

1. Students will be able to learn the basics of sentence construction.
2. They will be able to improve themselves in writing and speaking skills.
3. They will be able to comprehend and interpret various facets of life and nature.
4. They will be able to introduce themselves and others.
5. They will be able to deliver dialogues in different situations.

Course Content

1. Programs based on data Types
2. Programs to calculate factorial, Fibonacci series.
3. Programs on Arrays – Maximum, Minimum, Sum of the elements, etc
4. Basic Sorting Algorithms
5. Function based programs
6. Returning from Functions
7. Static data handling examples
8. Pointers based address manipulations programs
9. Programs to handle data through the use of structures.
10. Filing based programs – create, read, append etc

Course Outcomes:

- Write clear, elementary C++ programs.
- Understand algorithmic thinking and apply it to programming.
- Understand problem-solving techniques.
- Code with C++ arithmetic, increment, decrement, assignment, relational, equality and logical operators.
- Code C++ control structures (if, if/else, switch, while, do/while, for) and use built-in data types.
- Use standard library functions.
- Write user-defined function definitions.
- Understand and manipulate arrays.
- Pass arrays to functions and pointers.

B.Sc. (Honours) Computer Science -Semester II
Hardware Lab: Digital

Course Code CSC-252

L-0, T-0, P-4, C-2

Course Content

1. Design a JK Master slave flip-flop using IC 7473 and other necessary logic gates.
2. Design & implement a clocked JK flip-flop using NAND gates and other basic gates. Then convert the flip-flop into a T flip-flop and verify its truth table.
3. Design a synchronous counter which will count the sequence: 3 1 2 0 3.....
4. Verify IC 74194 for serial-in-serial-out operation using clock.
5. Design a debouncing switch using 555 timer. Sign a clocked D flip-flop using this.
6. Design a 2-bit right shift-register using D flip-flops.
7. Design a 2-bit parallel load register using D flip-flops.
8. Design a 3-bit Down counter using J-K flip-flops.
9. Design a 3-bit left shift register using J-K flip flops.
10. Design a clocked D flip-flop using NAND gates.
11. Design a synchronous counter to count the following sequence:
11 10 00 ...
12. Design a MOD-8 synchronous counter using necessary gate(s).
13. Design a clocked master-slave flip-flop using J-K flip flops.
14. Design a 2-bit right shift register with parallel load.
15. Design a counter to count the following sequence: 2,1,0,3,2,...
16. Design an asynchronous 3-bit up counter.
17. Design a 2-bit UP-DOWN counter (asynchronous).
18. Design the necessary sequential logic circuits to generate the following sequence:
0,2,1,3,...
19. Design a J-K flip-flop using NAND gates.
20. Design a MOD-8 asynchronous counter using J-K flip-flops.
21. Design a 4-bit right shift register.

Course Outcome:

- Learned the steps involved in designing a digital circuit.
- Learned the steps involved in debugging and fixing problems on digital hardware
- Learned how to design an adder using hierarchical circuit design techniques and in doing so learned the importance of design reuse.

B.Sc.(Honours) Computer Science -Semester III
SOFTWARE ENGINEERING and UML

Course Code: CSC301

L-4, T-1, P-0,C-5

Objectives:

The study of Software Engineering will help students to understand the scientific and engineering approach towards software development. It will help students to learn how to deal with the development of software that provide strength to industry. Issues like various models for software development, estimations of cost and time, quality, reliability, testing, maintenance are discussed. Concepts of UML adds beneficial knowledge to students about the designing aspects of Software Development.

Course Contents

Unit I

Introduction: Software Engineering approach, SDLC, Software Crisis, Software Process, Processmodels (Waterfall, Prototype, Iterative, Evolutionary and Spiral model). Overview of Quality Standards like ISO 9001, SEI – CMM. **(Lecture 08)**

Unit II

Software Requirement: Analysis and Specifications DFDs, Software Requirement Specifications, steps for constructing good SRS.

Software Project Planning: Size Estimation like lines of Code & Function Count, Cost Estimation Models, Static single & Multivariable Models, COCOMO. **(Lecture 08)**

Unit III

Software Design: Design Concepts & Principle, Cohesion & Coupling, Function Oriented Design, Object Oriented Design. Coding Structured programming, Programming style, Software Testing Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics. **(Lecture 08)**

Unit IV

Software Maintenance: Software Maintenance Process and its types, Introduction to Reverse Engineering, Software Reliability & Quality Assurance, Software Reliability issues, Software quality measurement. **(Lecture 08)**

Unit V

UML :What is UML, What is Modeling, UML Diagrams, Use Case Diagram, Class Diagram, Activity Diagram, Package Diagram, State-Transition Diagram, Sequence Diagram, Collaboration Diagram Component Diagram. **(Lecture 08)**

Course Outcomes:

Upon completion of the subject, students will be able to

- The students understands the process to be followed in the software development life cycle
- find practical solutions to the problems
- solve specific problems alone or in teams
- manage a project from beginning to end
- work independently as well as in teams
- define, formulate and analyse a problem

Text Books:

1. Jalote P., An Integrated approach to Software Engineering, Narosa.
2. Mall Rajib, Software Engineering, Prentice Hall of India.
3. Pressman R.S., Software Engineering – A Practitioner’s Approach, McGraw Hill Int.Ed..

Reference Books:

1. Sommerville Ian, Software Engineering, Pearson Education.
2. Agrawal K.K. & Yogesh Singh, Software Engineering, New Age Publication.
3. Waman S. Jawadekar, Software Engineering-Principles and Practice, McGraw Hill.
4. "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process" by Craig Larman (ISBN-13: 978-0130925695).

***Latest editions of all the suggested books are recommended.**

Objective:

To give the practical knowledge and the concept of how the data is exactly stored in memory. It also gives knowledge to perform different operations on data using concept of C programming and become familiar with basic techniques of algorithm analysis with writing recursive methods

Course Contents

Unit-I

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off. Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C.(**Lecture 08**)

Unit-II

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Applications of stack: Conversion of Infix to prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes, recursion in C, example of recursion.

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, double ended queue and priority queue. (**Lecture 08**)

Unit-III

Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Garbage Collection and Compaction.

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Binary Search Tree (BST), Insertion and Deletion in BST, Path Length. (**Lecture 08**)

Unit-IV

Searching Sequential search, binary search, comparison and analysis. Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Binary Search. (**Lecture 08**)

Unit-V

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Representations of Graphs, Adjacency Matrices, Traversal. (**Lecture 08**)

Course Outcome:

On Successful completion of the module students will be able to:

- Be familiar with basic data structure of algorithms.
- Be familiar with writing recursive methods by using C.
- Master the implementation of linked data structures such as linked lists and binary trees.
- Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues data structure.
- Be familiar with several searching and sorting algorithms including quick sort, Merge Sort and Heap Sort.
- Master analyzing problems and writing program solutions to problems using the above techniques

Text Books:

1. Lipschutz, “Data Structure”, TMH
2. A M Tenenbaum et. al., “Data Structures using C & C++”, PHI
3. YashwantKanitkar “Data Structure using C “

Reference Books:

1. Horowitz and Sahani, “Fundamentals of data Structures”, Galgotia.
2. R. Kruse etal, “Data Structures and Program Design in C” Pearson Education.
3. T. H .Cormen “Introduction to Algorithms “ PHI.
4. K Loudon, “Mastering Algorithms With C”, Shroff Publisher & Distributors.

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester III
English Communication & Soft Skills– III

Course Code: BCA349, CSC349, BSA349

L T P C

3 0 2 4

Objective: To make students learn basics of communication through business correspondence, oral and technical presentation.

Course Content:

Unit -1Basics of Communication

(06 hours)

- a) Language as a Tool of Communication
- b) Meaning and Definition of Communication
- c) 7 Cs of Communication
- d) Kinds and Process of Communication
- e) Importance of communication
- f) Barriers to Communication

Classroom Activity: (04 Hours)

Listening: Involving the students listen lectures on the above topics delivered by their teacher

Speaking: Enabling the students speak on different topics

Reading: Asking the students read the topics from books and class notes

Writing: Making the students write on the given topics

Unit -2 Forms of Technical Communication

(06 hours)

- a) Report Writing: Project Report, Thesis and Dissertation Writing, Structure of Report and Steps towards Report writing
- b) Proposal Writing: Essentials of Proposal Writing, Types of Proposal and Structure of Proposal
- c) Technical/Scientific PaperWriting: Essentials of Technical/Scientific PaperWriting
- d) Difference between Technical Communication (Objective Style) and General Writing (Literary Composition)

Classroom Activity: (04 Hours)

Writing: Making the students write different kinds of report, proposal and technical paper

Unit -3 Business Correspondence

(06 hours)

- a) Principles of Business Correspondence
- b) Business Letters:Sales Letter, Claim or Complaint Letter, Credit Letter, Letters of Enquiry
- c) Bio-Data, Resume and Curriculum Vitae
- d) Job Application (Cover Letter), Joining Report andResignation Letter
- e) Writing Email, Notice, Circular and Press Note
- f) Preparing Agenda and Minutes of the Meeting

Classroom Activity: (04 Hours)

Writing: Making the students write different kinds of business correspondence

Unit -4Oral Communication

(04 hours)

- a) Art of Public Speaking: Welcome Speech, Introductory Speech, Vote Of Thanks, Farewell Speech and Extempore Speech
- b) Role Play in diverse situations
- c) Debate on current issues
- d) Ad made Show

Classroom Activity:

(06 Hours)

Listening: Involving the students listen lectures on theoretical part delivered by their teacher

Speaking: Enabling the students deliver various kinds of speech and play role in diverse situations

Writing: Making the students write important points during debate

Text Books:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practices* O.U.P. New Delhi. 2008.
2. Chhabra T. N., *Business Communication*, Sun India Pub. New Delhi.

Reference Books:

1. Ruther Ford A., *Basic Communication Skills*, Pearson Education, New Delhi.
2. Sehgal M.K. & Khetrapal Vandana, *Business Communication*, Excel Books, New Delhi.
3. Mitra Barun K., *Effective Technical Communication*, O.U. P. New Delhi.
4. Mishra Sunita & Muraliksishra C., *Communication Skills for Engineers*, Pearson Education, New Delhi.

Learning Outcome:

1. Students will be able to learn fundamentals of communication.
2. They will be able to learn various kinds of business correspondence and technical communication.
3. They will be able to make extempore speech.
4. They will be able to learn the art of public speaking.
5. They will be able to play various kinds of role in different situations.
6. They will be able to demonstrate innovative ideas through Ad –made shows.
7. They will be able to express their views during debate.

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours) Computer Science -Semester III
Theory of Data Base Management System**

Course Code: CSC308

L-4, T-1, P-0,C-5

Objectives:

To gain the knowledge of Data Modeling using the Entity Relationship Model, SQL, Normalization, Transaction Processing Concepts, and Concurrency Control Techniques.

Course Contents

Unit I

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.(**Lecture 08**)

Unit II

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model.

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra.(**Lecture 08**)

Unit III

SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Insert, update and delete operations, sub queries, Aggregate functions, Joins, Unions, Intersection, Minus operations. Roles and Privileges. (**Lecture 08**)

Unit IV

Data Normalization: Functional dependencies, Normal form up to 3rd normal form & BCNF **Transaction Processing Concepts:** Transaction system, testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. (**Lecture 08**)

Unit V

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity. Overview of recovery techniques and Database Security. (**Lecture 08**)

Course Outcomes:

After undergoing Theory of DBMS, Student should be able to:

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDDL commands.
- Declare and enforce integrity constraints on a database
- Design and build a GUI application using a 4GL
- Concept of transaction and concurrency.

Text books:

1. Silberschatz Abraham, Korth Henry & Sudarshan S., Database Systems Concepts, McGraw Hill, 1997.
2. Elmars R. & Navathe S.B., Fundamentals of Database Systems, Addison Wesley, 2004
3. Date C.J., An Introduction to Database Systems, Addition Wiley.

Reference Books:

1. Melton Jim& Simon Alan, Understanding the New SQL: A Complete Guide, Morgan Kaufmann Publishers, 1993.
2. Majumdar A. K. &Battacharya P., Data Base Management Systems, Tata McGraw Hill, 1996.
3. Bipin Desai, An Introduction to Database Systems, Galgotia Publications, 1991

***Latest editions of all the suggested books are recommended.**

Objective:

The Objective of this subject is to provide the Fundamental Knowledge of Computer Networks and to provide the knowledge of some recent trends in Computer Networks.

Course Contents

Unit - I

Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer- transmission, switching methods, Integrated services digital networks. **(Lecture 08)**

Unit - II

Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, Ethernet, Error correction & detection algorithms, elementary data link layer protocols, sliding window protocols, error handling, High Level Data Link Control . **(Lecture 08)**

Unit - III

Network Layer: Point-to Point networks, concept of virtual circuit and LAN, routing algorithms, congestion control algorithms, internetworking, TCP/IP protocol, UDP, SCTP, IP addresses, IPv6 Packet Format ,Subnetting. **(Lecture 08)**

Unit - IV

Transport Layer: Design issues, connection management, Internet Transport Protocol (UDP), Ethernet transport Protocol, Transmission Control Protocol. (TCP). **(Lecture 08)**

Unit - V

Application Layer: Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Introduction to Cryptography and Network Security Communication Security (IPSec, Firewalls). Implement a program in for encryption a text with network security algorithm. **(Lecture 08)**

Course Outcomes:

Upon completion of the subject, students will be able to

- Explain the importance of data communications and the Internet in supporting business communications and daily activities.
- Explain how communication works in data networks and the Internet.
- Recognize the different internetworking devices and their functions.
- Explain the role of protocols in networking.
- Analyze the services and features of the various layers of data networks.
- Design, calculate, and apply subnet masks and addresses to fulfill networking requirements.
- Analyze the features and operations of various application layer protocols such as Http, DNS, and SMTP.

Text Books:

1. Computer Networks by A. S Tanenbaum”, Pearson education
2. Data and Computer Communication by W. Stallings, Macmillan Press
3. Computer Networks & Internet with Internet Applications by Comer Pearson Education
4. Internetworking with TCP/IP by PHI
5. Data Communication and Networking by Forouzan TMH

Reference Books:

1. Computer Networks with Internet Protocols by W Stallings, Pearson Education
2. Local and Metropolitan Area Networks by W Stallings, Pearson Education

***Latest editions of all the suggested books are recommended.**

Course Content

1. Programs to implement linear data structures in C.
2. Implement various sorting techniques.
3. Implement Recursive Heap Sort.
4. Implement Fibonacci Heap.
5. Implement Recursive algorithms – Tower of Hanoi.
6. Implementing Linked list through structures.
7. Implement a Generalized Link List with all possible operations.
8. Implementing BST.
9. Implementing Stacks & Queues using Linked List.
10. Implementing Priority Heap.
11. Write a program which creates an Adjacency matrix for directed and undirected graph.
12. Write a program which performs DFS search for a graph.
13. Write a program which finds the Adjacency nodes for a particular node in a graph.
14. Write a program which calculates the degree of a node in an undirected graph and also calculate the indegree&outdegree of a node in the directed graph.
15. Write a program which implements Prim's algorithm for MCST.
16. Write a program which implements Kruskal's algorithm for MCST.
17. Write a program which implements Dijkstra's algorithm for shortest path.

Course Outcomes:

Students who complete the course will have demonstrated the ability to do the following:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
- Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

Course Code CSC353

Course Content

Introduction to ANSI SQL

1. Introduction various DBMS – Oracle 9i, MySQLServer, MS-SQL Server.
2. Implementing the following on any one of the above servers. Description of Data Types.
3. Using Select queries , where clause, order by clause, distinct keywords etc on a sample database.
4. Create a sample Relational Database.
5. Using DDL to create Tables, Alter Tables, Drop Tables.
6. Using DML to update tables and insert data.
7. Use constraints to define Primary Keys, Foreign Keys, Cascade Operations and check Constraints.
8. Using DCL to grant & revoke permissions to users.
9. Taking backup on Hard Drive.
10. Design a Complete Database for a Bank with at least 2-NF conformity.

Course Outcomes:

After undergoing this laboratory module, the participant should be able to:

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

B.Sc.(Honours) Computer Science -Semester IV
Object Oriented Programming Concepts - C++

Course Code: CSC402

L-4, T-1,P-0,C-5

Objectives: To get a clear understanding of object-oriented concepts.

To understand objectoriented programming through C++.

Course Contents

Unit –I

Principles of object-oriented programming:-Object-Oriented Programming Paradigm, Basic Concepts of Object- Oriented Programming, Benefits of OOPs, Object-Oriented Languages, Applications of OOP, C++ Statements, Class, Structure of C++ Program, structure verses objects oriented. Tokens, expressions and control structures:-Introduction, Tokens, Keywords, Identifiers Basic Data types, User Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Manipulators, Type Cast Operator, Expressions and Implicit Conversions, Operator Precedence, Control Structures. **(Lecture 08)**

Unit-II

Classes and objects:-Specifying a Class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Function, Arrays within a Class, Memory Allocation for Objects, Static Data Member, Static Member Functions, Arrays of Objects, Object as Function Arguments. Constructors and destructors:-Introduction, Constructors, Parameterized Constructors, Multiple Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors, Destructor. **(Lecture 08)**

Unit-III

Functions in C++:-The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Argument, Const. Arguments, Function Overloading, Friend and Virtual Function. **(Lecture 08)**

Unit – IV

Operator overloading and type conversions :-Introduction, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators Using Friends, Manipulation of strings using Operators, Rules for Overloading Operators, Type conversions.

Inheritance: extending classes Introduction, Defining Derived Classes, Single Inheritance, Making aPrivate Member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance. Pointers, virtual functions. **(Lecture 08)**

Unit-V

Polymorphism: - Compile time Polymorphism, run time polymorphism, Pointers to Objects, ThisPointer, and Pointers to Derived Classes, Virtual Functions, and Pure Virtual Functions.

Managing Console & I/O operations and stream computations, working with files, Generic programming with templates, Exception Handling & manipulating strings. **(Lecture 08)**

Course Outcomes:

- Describe the differences between procedure oriented programming and object oriented programming.
- Define the three key features of the object-oriented programming language: encapsulation (abstraction), inheritance, and polymorphism.

- Describe the benefits of object oriented programming.
- Declare a class.
- Create objects, array of objects, and pointer to an object of a class.
- Identify the differences between private, public and protected members of a class.
- Describe how to access private, public and protected members of a class.
- Define member functions inside the class definition and outside the class definition.
- Understand the memory allocation of objects and class methods.
- Declare and use static data members and static methods.
- Design and use friend functions and friend classes.
- Use constructor and destructor functions to initialize and destroy class objects.
- Use inheritance to build class hierarchies.
- Overload operators to work with user-defined classes.
- Apply the facilities offered by C++ for Object-Oriented Programming.

Text Books:

1. Lafore R., Object Oriented Programming using C++, Galgotia
2. Venugopal A.R. & Rajkumar, T. Ravishanker, Mastering C++, Tata McGraw Hill.
3. Lippman S. B. & Lajoie J., C++ Primer, Addison Wesley, 3rd Edition.

Reference Books:

1. Parsons D., Object Oriented Programming with C++, BPB Publication.
2. Steven C. Lawlor, The Art of Programming Computer Science with C++, Vikas Publication.
3. Schildt Herbert, C++: The Complete Reference, Tata McGraw Hill.
4. Tony Gaddis, Watters, Muganda, Object-Oriented Programming in C++, Dreamtech.

***Latest editions of all the suggested books are recommended.**

Objectives:

To introduce basic concepts of algorithms

To introduce mathematical aspects and analysis of algorithms

Demonstrate a familiarity with major algorithms and data structures.

Apply important algorithmic design paradigms and methods of analysis.

Synthesize efficient algorithms in common engineering design situations.

Course Contents

Unit-I

Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences and their solution methods.

Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time:

Counting sort, Radix Sort, Bucket Sort, Medians and order statistics **(Lecture 08)**

Unit-II

Advanced Data Structure: Red Black Tree, Augmenting Data Structure, Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets. **(Lecture 08)**

Unit-III

Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound. **(Lecture 08)**

Unit-IV

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms. **(Lecture 08)**

Unit-V

Shortest path and Pattern Matching: Single Source Shortest Path, All pair Shortest Path, Traveling Salesman Problem, String Matching, NP-Hard and NP-Completeness. **(Lecture 08)**

Course Outcomes:

Students who complete the course will have demonstrated the ability to do the following:

- Correctness of algorithms using inductive proofs .
- Analyze best, worst and average -case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design.
- Recite algorithms that employ this paradigm.
- Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems,
- Explain what competitive analysis is and to which situations it applies. Perform competitive analysis.
- Compare between different data structures. Pick an appropriate data structure for a design situation.

Text Books:

1. Introduction to Algorithms by Thomas H CormenLeiserson et al, PHI.
2. Fundamentals of Computer Algorithms by Horowitz and Sahani, Galgotia.

Reference Books:

1. Design and Analysis of Computer Algorithms, Aho, Pearson Education.
2. Computer Algorithms : Introduction to Design and Analysis by Sara Baase and Allen Van Gelder, Pearson Education.
3. Algorithm Design by Jon Kleinberg and Eva Tardos, Pearson Education.
4. Fundamental of Algorithms by Brassard Bratley, PHI.
5. Algorithms Design by M T Goodrich et al, John Wiley.

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester IV
Formal language and Automata Theory

Course Code:CSC406

L-4,T-1,P-0,C-5

Objectives:

The primary objective of a Theory of Computation (TOC) course is to introduce the fundamental mathematical and computational principles that are the foundation of computer science. These include topics such as PDA, Turing machines, Automata, grammars and formal languages and Normal Forms.

Course Contents

UNIT - I

Introduction

Basic Concepts: Symbols, Strings, Language, Formal Language, Natural Language. Basic Machine And Finite State Machine. Finite Automata: Definition And Construction - DFA , NFA, NFA with epsilon-Moves, Minimization Of FA, Equivalence of NFA and DFA, Conversion of NFA with epsilon moves to NFA, Conversion of NFA With epsilon moves to DFA, Moore and Mealy Machines, Inter-conversion between Moore and Mealy Machines. **(Lecture 08)**

UNIT – II

Regular Expressions, Regular Grammar And Languages

Definition and Identities of Regular Expressions, Regular Grammar and Finite Automata: FA to RG and RG to FA, Left Linear and Right Linear Grammar and Inter-conversion between them. Closure Properties of RLs, Pumping Lemma for RL. **(Lecture 08)**

UNIT – III

Context Free Grammar And Languages

Definition and Construction of CFG, Definition and Generation of CFL from CFG Ambiguous Grammar and Removal of Ambiguity. Simplification of Grammar. Normal Forms of Grammar: CNF and GNF. Chomsky Hierarchy. **(Lecture 08)**

UNIT – IV

Pushdown Automata

Definition and Construction of DPDA and NPDA. Equivalence of PDAs and CFGs, Closure Properties Of CFLs, Concept of Post Machines. **(Lecture 08)**

UNIT – V

Turing Machines

Definition and Construction of Turing Machines Languages of TM Types of TM. Time Complexity of TM, Halting Problem, Church's Turing Hypothesis, Comparison And Applications of DFA, PDA and TM **(Lecture 08)**

Course Outcomes:

By the end of the Semester, the student will be able to:

1. Classify machines by their power to recognize languages,
2. Employ finite state machines to solve problems in computing,
3. Explain deterministic and non-deterministic machines,
4. Comprehend the hierarchy of problems arising in the computer sciences

Text Books :

1. Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekar, 2nd edition, PHI
2. Introduction to Theory of Computation –Sipser 2nd edition Thomson

Reference Books:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH.
3. “Elements of Theory of Computation”, Lewis H.P. &Papadimition C.H. Pearson /PHI.
4. “Introduction to Automata Theory Languages and Computation”.Hopcroft H.E. and Ullman J. D.Pearson Education.

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours)Computer Science -Semester IV
Concept of IOT(Internet of Things)**

Course Code: CSC407

L-4, T-1, P-0, C-5

Objective

The course aims to introduce students to the concepts underlying the Internet of Things (IoT) through a series of Lecture on the various topics that are important to understand the state-of-the-art as well as the trends for IoT. In order to pass the course, the students should be able to know:

Content

Unit I:

Introduction to Internet in general and Internet of Things: Introduction to Internet: layers, protocols, packets, services; Local Area Networks, MAC level, link protocols such as: point-to-point protocols, Ethernet, Wi-Fi 802.11, cellular Internet access, and Machine-to-Machine (M2M).

(Lecture 08)

Unit II:

IoT Technology Fundamentals: IoT definitions: overview, applications, potential & challenges, and architecture; Devices and gateways, Local and wide area networking; Data management, Business processes in IoT, Everything as a Service (XaaS), IoT Analytics, Knowledge Management.

(Lecture 08)

Unit III:

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. IoT examples: Case studies, e.g. sensor body-area-network and control of a smart home.

(Lecture 08)

Unit IV:

IoT Architecture-State of the Art – Introduction, State of the art, **Architecture Reference Model**- Introduction, Reference Model and architecture, IoT reference Model; IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

(Lecture 08)

Unit V:

Real-World Design Constraints- Introduction, Technical Design constraints, Data representation and visualization, Interaction and remote control. Uses of IoT in Industrial Automation, Commercial Building Automation , Wireless communication, etc.

(Lecture 08)

Course Outcomes:

Upon successful completion of this subject, students should:

- be able to explain and demonstrate various components of Internet of Things (IoT);
- be able to analyze the role and importance of IoT in the modern world;
- be able to investigate and propose various requirements of IoT for real world applications;
- be able to evaluate a variety of existing and developing architecture technologies for IoT;
- be able to describe and evaluate different applications of the IoT.

Textbook:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, **“From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”**, 1st Edition, Academic Press, 2014.

Reference Books:

1. Vijay Madiseti and ArshdeepBahga, **“Internet of Things (A Hands-on-Approach)”**, 1st Edition, VPT, 2014.
2. Francis daCosta, **“Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”**, 1st Edition, Apress Publications.

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours) Computer Science -Semester IV
Scientific Computing**

Course Code: CSC408

L-4, T-1, P-0, C-5

Objective:

Course Objective is to have investigation of the flexibility and power of project-oriented computational analysis. This course is a survey of numerical solution techniques for ordinary and partial differential equations. This course is a graduate breadth course to give students exposure to the algorithms and implementations often used in scientific computing.

Course Contents

Unit - I

Number System: Binary, Octal, Hexadecimal and Decimal, Floating Point Numbers. Binary Arithmetic: Basic Rules of Binary Addition, Subtraction, multiplication and division. Floating point format, Finite precision, round-off, machine epsilon, Error propagation and catastrophic cancellation. **(Lecture 08)**

Unit-II

Numerical linear algebra: Gaussian elimination, LU decomposition, Band-diagonal system of equations, Iterative methods, Eigen Systems

Numerical integration: Newton-Cotes Method, Romberg Method, Gaussian Quadrature, Monte Carlo Methods. **(Lecture 08)**

Unit - III

Root finding: Bisection, Regula-Falsi, Newton-Raphson and extension to multi-dimension
Optimization: Search by section, Newton's method, steepest descent, Conjugate gradient, Simulated annealing. **(Lecture 08)**

Unit - IV

Numerical differentiation: Finite difference, Spectral differentiation.

Initial value Ordinary Differential Equations: Forward and backward Euler, Predictor corrector and Runge-Kutta schemes, Stiff ODE's. **(Lecture 08)**

Unit - V

Boundary value problems: Shooting method, Finite-difference method.

Partial differential equations: Hyperbolic and parabolic equations, Elliptic equations.

(Lecture 08)

Course Outcomes:

On completion of this course you should be able to:

- Analyze a range of mathematical problems, model and / or solve them using an appropriate method and implement the solutions using one or more of the commonly-used programming environments listed above.
- Document your computer code so that others can understand it more easily
- Interpret and report on the results obtained.

Text Books:

1. W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery. *Numerical Recipes in C: The Art of Scientific Computing*. Cambridge University Press.
2. W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery. *Numerical Recipes in Fortran: The Art of Scientific Computing, volume 1-2*. Cambridge University Press.
3. J. Stoer and R. Bulirsch. *Introduction to Numerical Analysis*. Springer Verlag,

Reference Books:

1. *MATLAB documentation*. Online reference. <http://www.mathworks.com/>.
2. D. J. Hingham and P. J. Hingham. *MATLAB guide*. Society of Industrial and Applied Mathematics
3. C. F. van Loan. *Introduction to Scientific Computing: A Matrix-Vector Approach using MATLAB*. Prentice Hall

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours)Computer Science -Semester IV
Ethical Hacking Fundamentals

Course Code: CSC409

L-4, T-1, P-0, C-5

Objective:

- To understand how intruders escalate privileges.
- To understand Intrusion Detection, Policy Creation, Social Engineering, Buffer Overflows and different types of Attacks and their protection mechanisms
- To learn about ethical laws and tests.

Course Contents

Unit – I

Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, Foot printing and Scanning: Foot printing, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques. **(Lecture 08)**

Unit – II

Hacking Methodology: Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques. **(Lecture 08)**

Unit - III

Web and Network Hacking : SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls. **(Lecture 08)**

Unit - IV

Report writing &Mitigation: Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking. **(Lecture 08)**

Unit-V – Ethical Hacking Laws and Tests : An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking – Social Engineering, Host Reconnaissance. **(Lecture 08)**

Course outcomes:

The objectives are the goals of the course.

- General computer organization and architecture
- Ethical Hacking methodology
- Generalized exploit techniques
- Basic network concepts
- Networking vulnerabilities and countermeasures
- Develop skills and techniques for writing a research paper.

Text Books:

1. Michael T. Simpson, Kent Backman, James E. “Corley, **Hands-On Ethical Hacking and Network Defense**”, Second Edition, CENGAGE Course

Reference Books:

1. Steven DeFino, Barry Kaufman, Nick Valenteen, “**Official Certified Ethical Hacker Review Guide**”, CENGAGE Course.
2. Patrick Engebretson, “**The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy**”, Syngress Basics Series – Elsevier.
3. Whitaker & Newman, “ **Penetration Testing and Network Defense**” , Cisco Press, Indianapolis.

***Latest editions of all the suggested books are recommended**

B.Sc.(Honours) Computer Science -Semester IV
MOBILE DEVICE AND NETWORK ARCHITECTURE

Course Code:CSC410

L-4, T-1, P-0, C-5

Objective:

- To introduce the principles of Network Design.
- To understand the process of Network Deployments.
- To gain basic insight of Network Operations and Maintenance.

Course Contents

Unit - I

Communication Principles: Wireless Communication Principles, Radio Communication, Analog and Digital Communication, Benefits of Digital Signals, Computer Network, OSI Model, Mobile Network OSI layer functions, Mobile Network Protocol Layers. Introduction to Basic Telephony, POTS (Plain Old Telephone Service), Telephony Networks, PSTN (Public Switched Telephone Network), Telephone Network Hierarchy, Telecommunication Networks, Fixed Networks, Mobile Networks. **(Lecture 08)**

Unit - II

Mobile Cellular Networks : Cellular Network Concepts, Cells and Base Stations, Frequency and Interface in Cells, Access Channels, Mobile Network Architecture, Mobile Network, Mobile Network Subsystems, Mobile Station, Base Station Subsystems, Network Switching Subsystems, Mobile Network Protocol Stacks, Core Networks, PLMN (Public Land Mobile Network), Mobile Network Fundamentals, Mobile Network Features, Mobility, Registration, Handoff, Roaming, Mobile Network Fundamentals (SMS), SMS (Short Message Service), SMS Network Architecture, SMS Network Elements, SMS Protocols, SMS Applications & Short Codes.**(Lecture 08)**

Unit - III

GSM and CDMA Networks: GSM History, GSM RF Channels, 2G Network Architecture, GSM Protocol Stack, GPRS Standards, CS and PS Domains, GPRS Architecture, GPRS Network Architecture, GPRS Protocols, CDMA Evolution, 2G CDMAOne, CDMA 2G Standards, 3GPP2 Network Architecture, Mobile IP, UMTS Spectrum, UMTS Radio Access Network, UMTS Protocol Stacks, SIP Network, UMTS Multiple Access Network Architecture, 4G.**(Lecture 08)**

Unit - IV

Handset Evolution, Handset Characteristics and Features : Mobile Phone and Network Evolution, Cellular Networks, Cell Phones, Mobile Phones, Mobile Handset Characteristics, Wireless Cellular, Bluetooth , Display, Keypad, Camera, Mobile Handset Categories, Low end Phones, Feature Phones, Smart phones, Handset Components, Handset Design, Handset Manufacture, Handset Bill of Materials, assembling handsets. **(Lecture 08)**

Unit - V

Hardware Architecture and Subsystems : Handset hardware architecture, Primary Hardware Subsystems, Element inside a Mobile Handset, Hardware Architecture Evolution, Processing Subsystem architecture, Hardware architectural trends, CPU and Memory, Memory, Internal storage, Hardware evolution, Introduction to the Radio subsystems, Function of the RF Subsystems, Handset Power Requirements, Power Management, Power reduction techniques, Power Subsystem

components, Introduction and Definition to the SIM, Smartcards in general and concept of Mobile Identity , Functions and usage of the SIM , Phones without SIMs. **(Lecture 08)**

Course Outcomes:

- Determine solutions using problem solving principles, logic and systematic methodologies.
- Evaluate the architecture and principles of operation of computer systems and networks.
- Synthesize principles and theories of computer science and software engineering for application to different computing paradigms.
- Apply the fundamental design paradigms and technologies to mobile computing applications.
- Develop consumer and enterprise mobile applications using representative mobile devices and platforms using modern development methodologies.
- Design effective mobile interfaces using human computer interaction principles.
- Evaluate the role of mobile applications in software intensive systems.
- Evaluate the usability of representative mobile devices such as smart phones and tablets.

Text Books:

1. Wireless and Mobile Network Architectures by Yi-Bang Lin and Imrich Chlamtac, Wiley-India.
2. Mobile Networks Architecture by Andre Perez, Wiley.

Reference Books:

1. Mobile Computing – Technology, Application & Service Creation by Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, Tata McGraw-Hill.
2. GSM - Architecture, Protocols and Services by Jörg Eberspächer, Hans-Joerg Vögel, Christian Bettstetter, Christian Hartmann John Wiley & Sons.

*** Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester IV
English Communication & Soft Skills– IV

Course Code: BCA449, CSC449, BSA449

L T P C

3 0 2 4

Objective: To enhance students' soft skills and personality by inculcating values in them for suitable employability.

Course Content:

Unit -1 Soft Skills and Personality Development (06 hours)

- a) Introduction to Soft Skills
- b) Classification of Soft Skills
- c) Manners and Etiquettes
- d) Traits of Leadership

Classroom Activity: (02 Hours)

Listening: Involving the students listen lectures on the above topics delivered by their teacher

Speaking: Enabling the students speak on the above topics

Writing: Making the students write on the given topics

Unit -2 Technical Vocabulary and Presentation (06 hours)

- a) Abbreviations and Technical terms of Computer Science
- b) Writing Paragraph on Eminent Personalities in the field of Computer Science and Information Technology: Charles Babbage, Dennis Ritchie, Larry Page, Tim Berners Lee, Larry Ellison, Bill Gates, Michael Dell, Philip Don Estridge, Charles Ranlett Flint, Martin Cooper, Steve Jobs and Mark Elliot Zuckerberg.
- c) Speech on Eminent Personalities in the field of Computer Science and Information Technology: Sundar Pichai, N. R. Narayana Murthy, Azim Premji, Nandan Nilekani, Sam Pitroda and Pranav Mistry.
- d) Presentation on the Profile of Leading Companies of Information Technology: Microsoft Corporation, Oracle Corporation, IBM (International Business Machines), SAP, Symantec Corporation, EMC and Hewlett Packard Enterprise
- e) Writing Scientific and Technical Paper

Classroom Activity: (06 Hours)

Listening: Involving the students listen lectures on the above topics delivered by their teacher

Speaking: Enabling the students speak on the above topics

Writing: Making the students write on the given topics

Unit -3 Values and Ethics (06 hours)

- a) Values and Ethics
- b) Different Attitudes to Work
- c) Ethics at Work Place
- d) Professional Ethos and Code of Professional Ethics

Classroom Activity: (04 Hours)

Listening: Involving the students listen lectures on the above topics delivered by their teacher

Speaking: Enabling the students speak on the above topics

Writing: Making the students write on the given topics

Unit -4 Job Interview Strategies

(02 hours)

- a) Body Language
- b) Debate on current issues and Leading Companies of Information Technology
- c) Group Discussion
- d) Preparing Relevant Probable Questions for Interview
- e) Mock Interview

Classroom Activity: (08 Hours)

Listening: Involving the students listen lectures on theoretical part delivered by their teacher

Speaking: Enabling the students speak effectively during group discussion and mock interview

Writing: Making the students write important points during group discussion

Text Books:

1. MitraBarun K., *Personality Development and Soft Skills*, O.U.P., New Delhi. 2012.
2. Onkar R.M., *Personality Development and Career Management: A Pragmatic Perspective*, S. Chand & Co. Ltd., New Delhi. 2011.
3. Mishra Sunita&Muraliksishra C., *Communication Skills for Engineers*, Pearson Education, New Delhi.

Reference Books:

1. Raman Meenakshi& Sharma Sangeeta, *Technical Communication-Principles & Practices*, O.U.P. New Delhi. 2008.
2. Chabbra T N, *Business Communication*, Sun India Pub. New Delhi.
3. Sehgal M.K. &KhetrapalVandana, *Business Communication*, Excel Books, New Delhi.
4. Newstron John W., *Organizational Behaviour: Human Behaviour at work-* Tata McGraw Hill.
5. Luthansfred, *Organizational Behaviour*-Tata Mcgraw Hill.
6. Sanjay Kumar &PushpLata, *Communication Skills*, Oxford University Press.
7. Govindarajan M., *Engineering Ethics*, Prentice Hall (India), New Delhi

Learning Outcome:

1. Students will be able to communicate effectively.
2. They will be able to develop their personality and soft skills.
3. They will be able to face interview confidently.
4. They will be able to participate actively in group discussion.
5. They will be able to inculcate values and ethics in their life.
6. They will be able to develop their competence for suitable job in a good organisation.

*** Latest editions of all the suggested books are recommended.**

Course Content

- Using iostream.h functions in C++ Implementing a basic class in C++ Creation of Objects and parameter passing.
- Implementing basic programs using object oriented approach A sample mark sheet generator in C++.
- Implementing friend functions, inline functions. Implementing Inheritance.
- Implementing Virtual Functions & Virtual Base classes.
- Implementing Function Overloading, constructor overloading, operator Overloading Using Container Classes.
- Passing Objects by reference.
- Implementing a Linked List using new & delete. Filing operations using fstream.h

Course Outcomes:

- Be able to understand the difference between object oriented programming and procedural oriented language and data types in C++.
- Be able to program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.

At the end of the course students will able to simulate the problem in the subjects like Operating system, Computer networks and real world problems.

B.Sc.(Honours) Computer Science -Semester IV
Algorithm Design Lab

Course Code: CSC454

L-0, T-0, P-4, C-2

Course Contents

1. Creation of a binary search tree and insertion & deletion into it.
2. Creation of a Red Black tree and all the associated operations on it.
3. Implementing an AVL tree and all the associated operations on it.
4. Multiplication of two matrices using Strassen's Matrix Multiplication method.
5. Solving Knapsack problem.
6. Implementing shortest path algorithms (Dijkstra's and Bellman Ford Algorithm).
7. Finding the minimum cost Spanning Tree in a connected graph.
8. Solving 8 Queen's problem.
9. Finding the number of connected components in a Graph

Course Outcomes:

- learn good principles of algorithm design;
- learn how to analyze algorithms and estimate their worst-case and average-case behaviour (in easy cases);
- become familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles;
- learn how to apply their theoretical knowledge in practice (via the practical component of the course).

**B.Sc.(Honours)Computer Science -Semester V
Numerical and Optimizing Techniques**

Course Code:CSC501

L-4,T-1,P-0,C-5

Unit I

System of Linear Equations: Solution of systems of linear equations – Direct method, Gauss Jordan and Gauss Elimination methods, Iterative methods – Jacobi and Gauss Seidel methods. **(Lecture 08)**

Unit II

Solution of systems of nonlinear equations: Bisection method, Regula -Falsi method, Newton-Raphson method, Rate of convergence. **(Lecture 08)**

Unit III

Euler method, Runge-Kutta, Curve Fitting, Numerical differentiation.

Numerical integration: Trapezoidal and Simpson's rule. **(Lecture 08)**

Unit IV

Linear Programming: Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method and Artificial Variable Method, Two Phase Method, Duality. **(Lecture 08)**

Unit V

Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution.

Assignment Problems: Definition, Hungarian Method for AP. **(Lecture 08)**

Course Outcomes:

At the end of the course, the students would be acquainted with the basic concepts in numerical methods,

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigenvalue problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.

Text Books:

- 1.“Computer oriented Numerical methods” By “Raja Raman V”, PrenticeHall.
- 2.“Numerical methods in Engineering and Science” By “Grewal B. S”,Khanna Publishers, Delhi.
- 3.S.D.Sharma, “Introduction To Operation Research”,KedarNath and Ram Nath& Co., Meerut.

Reference Books:

- 1.H.ATAHA,”Operational Research-An Introduction”, Macmillan.
- 2.Hiller and Libermann,”Introduction to Operational Research”,McGraw Hill, Company.
- 3.K.Swarup, P.K Gupta &A.Manmohan,”Operational Research”.S.Chand.
- 4.T. Veerarajan, T Ramachandran, “Theory and Problemsin Numerical Methods”, TMH.
- 5.PradipNiyogi, “Numerical Analysis and Algorithms”, TMH.
- 6.FrancisScheld, “Numerical Analysis”, TMH.

*Latest editions of all the suggested books are recommended.

B.Sc.(Honours) Computer Science -Semester – V
COMPUTER GRAPHICS

Course Code:CSC502

L-4,T-1,P-0,C-5

Objectives:

This subject covers computer graphics concepts and basic techniques for operating with 2/3-dimensional objects. It also gives an overview of typical applications of computer graphics, 2/3 geometric transformation and basic principles/techniques of computer animation.

Course Content

Unit I

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices Output primitives : Points and lines, line drawing algorithms, mid-point circle drawing algorithm .Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms. **(Lecture 08)**

Unit II

2-D geometrical transformations: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms transformations between coordinate systems. **(Lecture 08)**

Unit III

2-D viewing:The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm. **(Lecture 08)**

Unit IV

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations,3-D viewing. **(Lecture 08)**

Unit V

Visible surface detection methods:Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

(Lecture 08)

Course Outcomes:

- Students will demonstrate an understanding of contemporary graphics hardware.
- Students will create interactive graphics applications in C++ using one or more graphics application programming interfaces.
- Students will write program functions to implement graphics primitives.
- Students will write programs that demonstrate geometrical transformations.
- Students will demonstrate an understanding of the use of object hierarchy in graphics applications.
- Students will write program functions to implement visibility detection.
- Students will write programs that demonstrate computer graphics animation.
- Students will write programs that demonstrate 2D image processing techniques.

Text Books:

1. “Computer Graphics C version”, Donald Hearn and M.Pauline Baker, Pearson Education.
2. “Computer Graphics Principles & practice”, second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

Reference Books:

1. Procedural elements for Computer Graphics, David F Rogers, Tata McGraw hill, 2nd edition.
2. “Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH.
3. Principles of Computer Graphics, ShaliniGovil, Pai, Springer.
4. Computer Graphics, Steven Harrington, TMH.

***Latest editions of all the suggested books are recommended.**

Objective:

1. To understand basic architecture of 8 bit and 16 bit microprocessors.
2. To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
3. To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors.
4. To understand RISC and CISC based microprocessors.
5. To understand concept of multi core processors.

Course Content

Unit I

Microprocessor Concepts: Overview of Microcomputer Structure and Operation, Evolution of Microprocessor and different Microprocessor Family, Microcontroller, Microprocessor Architecture and its basic operation, Microprocessor applications – Microprocessor based system design aids and troubleshooting techniques. **(Lecture 08)**

Unit II

Microprocessor Structure and Design: 8085 Microprocessor Architecture, Register Structure, Instruction Set, Interrupt Structure, Bus Organization. Introduction to 16-bit Microprocessors: Architecture of 8086, Register Organization, Addressing Modes, Instruction Set, Interrupts and Interrupt Service Routines (ISR's), 8086 pin functions, Bus operation, Memory segmentation, Clock generator, Memory Buffer. **(Lecture 08)**

Unit III

Assembly Language Programming: Basic syntax of 8086 Assembly language, Instruction templates, Assembly language program development tools, Arithmetic and Logic instructions, Program Control Instructions (jumps, conditional jumps), Loops, Instruction timing and delay loops, Handling Strings, Procedures, Assembler Directives. **(Lecture 08)**

Unit IV

Programmed I/O, Interrupt Driven I/O, DMA, DMA controller. Memory Interfacing: SRAM, ROM and DRAM (using RAM Controller-Intel 8203). Applications of the Peripheral Controllers namely 8255-PPI,8253-PIT, 8259-PIC and 8237-DMAC. Interfacing of the Peripheral Controllers with 8086 microprocessor. **(Lecture 08)**

Unit V

Advanced Microprocessor: Introduction to bit slice processor, signal processing processor, Overview of the Pentium Processor, Hyper Threading, Core-2-duo, RISC architecture Of IBM, CISC architecture of SUN SPARC Study of Super SPARC Architecture. **(Lecture 08)**

Course Outcomes:

- Identify the basic elements and functions of contemporary microprocessors (8085, 8086, 80386) and microcontrollers (8051).(Knowledge)
- Explain the architecture and operation of microprocessors (8085, 8086 and 80386) and microcontroller (8051).(Comprehension)
- Identify and explain the operations of peripherals and memories typically interfaced with microprocessors and microcontrollers.
- Analyze the reason behind the cost of executing instructions in terms of time and space in simple programs. (Analysis)
- Students should be able to use an Integrated Development Environment (IDE) as a modern software tool for embedded system development. (Application &Synthesis)

- Students should understand the hardware/software tradeoffs involved in the design of microprocessor and microcontrollers based systems.

Text Books:

1. “Microprocessor Architecture, Programming, and Applications with the 8085”, Gaonkar, Ramesh S., Pen Ram International Publishing.
2. “Advanced Microprocessors and Peripherals: Architecture Programming and Interfacing”, Ray, A.K. & Burchandi, K.M. Tata McGraw Hill.
3. “Microprocessors Interfacing”, Hall D.V., Tata McGraw Hill.
4. “Microprocessors and Microcontrollers”, B.P. Singh & Renu Singh, New Age International.
5. “Advance Microprocessor”, Deniel Tabak, TMH
6. “The 8088 and 8086 Microprocessors”, Triebel & Singh, Pearson Education.
7. “IBM PC Assembly Language & Programming”, Peter Abel, PHI.

Reference Books:

1. “Microcomputer Systems: The 8086/8088 Family”, Liu and Gibson G.A., Prentice Hall (India).
2. “INTEL microprocessors”, Brey, Barry B., Prentice Hall (India).
3. “Advanced Microprocessor & Interfacing”, Ram B., Tata McGraw Hill.
4. “Microprocessors and Interfacing & Applications”, Renu Singh & B.P. Singh, New Age International.

***Latest editions of all the suggested books are recommended.**

B.Sc. (Honours) Computer Science -Semester – V
COMPILER DESIGN

Course Code:CSC504

L-4,T-1,P-0,C-5

Objective:

After you complete this course, you should be able to: describe the theory and practice of compilation, in particular, the lexical analysis, parsing and code generation and optimization phases of compilation, and design a compiler for a concise programming language.

Course Content

UNIT-I

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools. **(Lecture 08)**

UNIT-II

Context Free grammars and parsing : Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing , Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification. **(Lecture 08)**

UNIT-III

Semantics : Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code –abstract syntax tree, translation of simple statements and control flow statements., Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations. **(Lecture 08)**

UNIT-IV

Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation. Code optimization : Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs. **(Lecture 08)**

UNIT-V

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block. **(Lecture 08)**

Course Outcomes:

- To apply the knowledge of lex tool &yacc tool to devleop a scanner & parser.
- To design & conduct experiments for Intermediate Code Generation in compiler.
- To design & implement a software system for backend of the compiler.
- To deal with different translators.
- To develop program to solve complex problems in compiler
- To learn the new code optimization techniques to improve the performance of a program in terms of speed & space.
- To acquire the knowledge of modern compiler & its features.
- To learn & use the new tools and technologies used for designing a compiler
- To use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of data mining.

TEXT BOOKS :

1. Introduction to Theory of computation.Sipser,2ndEdition,Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Raviseti, Pearson Education.

REFERENCE BOOKS :

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Thomson.

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester – V
CORE JAVA

Course Code:CSC506

L-4,T-1,P-0,C-5

Unit I

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing. **Core Java:** Introduction to Java, Fundamental Programming Structure (Data types, Variables, Operators, Control Flow, Arrays, Big Numbers) **(Lecture 08)**

Unit II

Introduction to Object Oriented Programming: Objects & Classes, Constructors, Overloading Methods, Inheritance, Method Overriding, Using final and static keywords, Generic Array List, Object Wrappers and Auto boxing, Abstract Classes, Enumeration, String Handling, Package and Interface. Java Collections. **(Lecture 08)**

Unit III

Exception Handling. Input / Output: File, Directories, Using Streams, File Management, and Serialization.

Graphics Programming: Applet Fundamentals, Java Applet, Introduction to AWT, Event handling, AWT controls, Working with Frames, Graphics, 2D Shapes, Colors, Fonts, Displaying Images, Layout managers, Menus, Multithreading. **(Lecture 08)**

Unit IV

Swings: Overview, Swing Components (JApplet, Icons, Labels, Text Fields, Buttons, Check Boxes, Radio Buttons, Combo Boxes, Tabbed Pane, Scroll Pane, Split Panes, Tables, Menus, Progress Bar, Toolbars), Pluggable Look and feel, Dialog Boxes, Inner frames Collections: Collection Interfaces, Concrete Collection, The Collections Framework. **(Lecture 08)**

Unit V

JDBC: The Design of JDBC, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database. **(Lecture 08)**

Course Outcomes:

- The students will have the competence in the use of Java Programming language.
- An understanding of the principles and practice of object oriented programming in the construction of robust maintainable programs which satisfy the requirements.
- Design and implement an application that demonstrates their competency with Java syntax, structure and programming logic, incorporating basic features of the language as well as some features from the I/O (Input/Output) or GUI libraries.
- Competence in the use of Java Programming language in the development of small to medium sized application programs that demonstrate professionally acceptable coding and performance standards.

Text Books:

1. Cay S. Horstmann, Gary Cornell, “Core Java Volume 1, Fundamentals”, PHI
2. Cay S. Horstmann, Gary Cornell, “Core Java 2 Volume 2, Advanced Features”, PHI
3. Naughton, Schildt, “The Complete Reference JAVA2”, TMH
4. Margaret Levine Young, “The Complete Reference Internet”, TMH

Reference Books:

1. Balagurusamy E, “Programming in JAVA”, TMH
2. Dustin R. Callway, “Inside Servlets”, Addison Wesley
3. Mark Wutica, “Java Enterprise Edition”, QUE
4. Steven Holzner, “Java2 Black book”, Dreamtech

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours) Computer Science -Semester – V
C#.Net**

Course Code:CSC507

L-4,T-1,P-0,C-5

UNIT I

Review of OOP Concepts - Overview of .NET Framework - Basic Elements of C# - Program Structure and simple Input and Output Operations – Operators and Expressions – Statements – Arrays and Structures.

(Lecture 08)

UNIT II

Inheritance - Namespace – Polymorphism – Interface and Overloading – Multiple Inheritance – Property – Indexes – Delegates – Publish/Subscribe Design Patterns- Operator overloading-Method Overloading.

(Lecture 08)

UNIT III

C# Concepts for creating Data Structures - File Operation – File Management systems – Stream Oriented Operations- Multitasking – Multithreading – Thread Operation – Synchronization.

(Lecture 08)

UNIT IV

Working with XML – Techniques for Reading and Writing XML Data - Using XPath and Search XML - ADO.NET Architecture – ADO.NET Connected and Disconnected Models – XML and ADO.NET – Simple and Complex Data Binding– Data Grid View Class.

(Lecture 08)

UNIT V

Application Domains – Remoting – Leasing and Sponsorship - .NET Coding Design Guidelines – Assemblies – Security – Application Development – Web Services - Building an XML Web Service - Web Service Client – WSDL and SOAP – Web Service with Complex Data Types – Web Service Performance.

(Lecture 08)

Course Outcomes:

- Knowledge of the structure and model of the programming language C#
- Evaluate user requirements for software functionality required to decide whether the programming language C # can meet user requirements.
- Be familiar with using language interfaces, and inheritance
- Be familiar with using .NET collections
- By building sample applications, the student will get experience and be ready for large-scale projects.
- Students are capable of developing software products using C# and .NET after this course.

TEXT BOOKS

1. S. ThamaraiSelvi and R. Murugesan “A Textbook on C# “, Pearson Education.
2. Stephen C. Perry “ Core C# and .NET”, Pearson Education.

REFERENCES

1. Jesse Liberty, “Programming C#”, Second Edition, O’Reilly Press.
2. Robinson et al, “Professional C#”, Fifth Edition, Wrox Press.
3. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw Hill.
4. Andrew Troelsen, “C# and the .NET Platform”, A! Press, 200
5. Thaana Thai and Hoang Q. Lam, “. NET Framework Essentials”, Second Edition, O’Reilly.

***Latest editions of all the suggested books are recommended.**

Course Code:CSC553

L-0, T-0, P-6, C-3

Course Content

1. Java
2. Installation of JDK 1.8
3. Installation of NetBeans 7.1
4. Using Netbeans
5. Basic Programs to demonstrate the working of basic data types.
6. Programs to implement the use of Objects.
7. Programs to parse data with the help of Wrapper classes.
8. Using function overloading
9. Constructor overloading & passing object as parameters
10. Using finalize() method
11. Programs to implement multithreading
12. Programs to implements String handling
13. Programs to implement file handling
14. Programs to implement JDBC
15. Programs to implement JFC-SWING-All controls
16. Programs to implement event handling on Swing controls
17. Implementing Java-2D In Applets

Course Outcomes:

- The students will learn to write, compiling & execute basic java program.
- The student will learn the use of data types & variables, decision control structures: if, nested if etc.
- The student will learn the use loop control structures: do, while, for etc.
- The student will be able to create classes and objects and use them in their program.
- The student will learn the user interfaces and inner classes, wrapper classes, generics

**B.Sc.(Honours) Computer Science -Semester V
C#.Net Lab**

Course Code:CSC554

L-0, T-0, P-6, C-3

Course Content

1. Installing Visual Studio 2013
2. Creating a C# project within Visual Studio
3. Basic Programs to demonstrate the working of basic data types.
4. Programs to implement the use of Objects.
5. Programs to implement multithreading
6. Programs to implements String handling
7. Programs to implement file handling
8. Using ADO.Net to handle data, connecting to a database, firing queries to display data
9. Using XML Libraries to export data from a database to an XML file
10. Developing windows forms
11. Using various controls on Windows forms.

Course Outcomes:

Upon completion of this course, the student should be able to:

1. Demonstrate how to design, code, compile, and execute business-oriented programs using the C# programming language commands
2. Develop programming logic for business-oriented programs using appropriate tools such as TOE (Task, Object and Event) charts, hierarchy charts, flowcharts, and pseudocode
3. Identify the characteristics unique to object-oriented programming vs. structured programming
4. Develop code that validates input data
5. Analyze program-generated output for correctness
6. Develop user-interfaces that generate user-friendly interfaces
7. Use debugging techniques to find and resolve programming errors
8. Prepare internal documentation into each computer program

B.Sc.(Honours) Computer Science -Semester VI
Mobile Computing

Course Code:CSC603

L-3,T-1,P-0,C-4

Objectives:

The course is an introduction to the fundamentals of mobile computing. The ubiquity of wireless communication technologies and the proliferation of portable computing devices have made possible a mobile computing era in which users, on the move, can seamlessly access network services and resources, from any-where, at any-time.

Course Content

Unit I

Introduction to Mobile computing, wireless communication: communication satellite, electromagnetic spectrum, multiple access schemes, cellular communication-generations 1g,2g,3g,4g, CDMA & GSM overview, Mobile Devices-PDA, palm, window CE. **(Lecture 08)**

Unit II

Wireless LAN, Types of Wireless LAN Network, IEEE 802.11 standards, infrared systems, Bluetooth: network, application, protocol stack, frame structure, overview of WiMAX standard, HiperLAN, Ad hoc networks. **(Lecture 08)**

Unit III

Physical Mobility, IPv4, IPv6, Mobile IP, Mobility support in IPv4 & IPv6, Cellular IP, TCP form mobility, CODA file system. **(Lecture 08)**

Unit IV

Mobile Ad hoc networks, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc On demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA) . **(Lecture 08)**

Unit V

Mobile Internet & wireless Web, WAP, WAP Protocol stack, security issues in mobile computing, IEEE 802.11 security through WEP, Bluetooth security, WAP 2.0 security. **(Lecture 08)**

Course Outcomes:

- To learn the basics of Wireless voice and data communications technologies.
- To build working knowledge on various telephone and satellite networks.
- To study the working principles of wireless LAN and its standards.
- To build knowledge on various Mobile Computing algorithms
- To build skills in working with Wireless application Protocols to develop mobile

Text Books:

1. Mobile Computing Theory & Practice “Kumkumgarg – PEARSON”.
2. J.Schiller “Mobile communication “Pearson “

Reference Books:

1. Mobile computing “Ashoke K. Talikdar”
2. Mobile Computing Technology, Applications & Service creation, “Ashoke K. Talikdar, RupaYavagal” McGraw Hill.

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester VI
DIGITAL IMAGE PROCESSING

Course Code: CSC605

L-3, T-1, P-0,C-4

Objectives: Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing.

Course Content

Unit I

Digital image fundamentals - Digital Image through scanner, digital camera. Concept of gray levels. Gray level to binary image conversion, Sampling and quantization, Relationship between pixels .Imaging Geometry. **(Lecture 08)**

Unit II

Image Transforms 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hotelling transform. Image enhancement Point processing. Histogram processing. Spatial filtering. **(Lecture 08)**

Unit III

Enhancement in frequency domain, Image smoothing, Image sharpening, Colour image processing: Pseudocolour image processing, full colour image processing. **(Lecture 08)**

Unit IV

Image Restoration Degradation model, Algebraic approach to restoration, Inverse filtering, Leastmean square filters, Constrained Least Squares Restoration, Interactive Restoration. **(Lecture 08)**

Unit V

Image segmentation Detection of discontinuities. Edge linking and boundary detection, Thresholding, Region oriented segmentation. Image compression Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression. **(Lecture 08)**

Course Outcomes:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

Text Books :

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education.

Reference Books :

1. Fundamentals of Digital Image processing – A.K.Jain , PHI.
2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA.
3. Digital Image Processing – William K. Pratt, John Wiley, 3rd Edition.
4. Fundamentals of Electronic Image Processing – Weeks Jr., SPIC/IEEE Series, PHI

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours) Computer Science -Semester VI
Artificial Intelligence**

Course Code:CSC617

L-3, T-1, P-0,C-4

Objectives:

The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments.

Course Content

Unit I

Introduction: What is AI?, Foundations of AI, History of AI, Areas & applications of AI, Problems in AI, AI Techniques, Programming languages for AI, Search Techniques: Non Heuristic Search Technique – Breadth First Search (BFS), Depth First Search (DFS). **(Lecture 08)**

Unit – II

Heuristic Search Techniques – Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction & Means-ends Analysis. Introduction to PROLOG & LISP. **(Lecture 08)**

Unit – III

Knowledge Based Systems: Introduction, importance of knowledge, knowledge representation & mapping, approaches to knowledge representation, issues in knowledge representation, knowledge Manipulation, Knowledge acquisition. Forward v/s Backward chaining, Matching & control knowledge. **(Lecture 08)**

Unit – IV

Formalized Symbolic Logic: syntax & semantics of FOPL, Inference rule, the resolution principal, normal deductive inference models, representing simple facts in logic, representing instance and relationships, Resolution and natural deduction, representing knowledge using rules. **(Lecture 08)**

Unit – V

Expert Systems: Definition and characteristics of Expert System, Expert system shells, Knowledge Engineering, knowledge acquisition, expert system development life cycle & expert system tools, MYCIN & DENDRAL examples of expert system. **(Lecture 08)**

Course Outcomes:

- Understand fundamental AI concepts and current issues.
- Understand and apply a range of symbolic and non-symbolic AI techniques including search and planning procedures, logic-based reasoning, neural networks, genetic programming and reasoning with uncertain information.
- Recognize computational problems suited to an AI solution and implement solutions.
- Know of applications in different areas of computing including the web and human interaction.
- Understand the design issues inherent in different AI approaches

Text Books:

1. Dan W Patterson “ Introduction to Artificial Intelligence and Expert System PHI”
2. Stuart Russell and Pete nerving “Artificial Intelligence :A modern Approach PHI”

Reference Books:

1. Artificial Intelligence by Elaine Rich & Kevin Knight (Second Edition)
2. Principles of Artificial Intelligence by Morgn Kaufmann.
3. N.J. Jilsson, Problem Solving Methods in Artificial Intelligence, McGraw-Hill
4. E.B.Hunt, Artificial Intelligence, Academic Press

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester VI
EMBEDDED SYSTEM

Course Code: CSC607

L-3, T-1, P-0,C-4

Objectives:

To introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around

Course Content

Unit I

Fundamentals To Embedded Systems: Embedded systems and its applications, Embedded Operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design. Definition and Classification – Overview of Processors and Hardware Units in an Embedded System. **(Lecture 08)**

Unit II

Hardware Fundamentals For The Embedded Developers: Digital circuit Parameters- Open collector outputs Tristate outputs I/O sinking and Sourcing, PLD's, Watchdog Timers, Hardware design and development. Synchronous–ISO–synchronous and Asynchronous Communications from Serial Devices – Examples of Internal Serial–Communication Devices – UART and HDLC – Parallel Port Devices-Sophisticated interfacing features in Devices/Ports Timer and Counting Devices. **(Lecture 08)**

Unit III

Embedded Programming: Programming in Assembly Language (ALP) vs. High Level Language – C Program Elements – Macros and Functions – Use of Pointers – Use of Function Calls – Multiple Function Calls Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures, Optimization of Memory Codes Tasks, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes. **(Lecture 08)**

Unit IV

Real Time Operating Systems: OS Services – Interrupt Routines Handling – Task Scheduling Models – Handling of Task Scheduling and Latency and Deadlines as Performance Metrics – Inter Process Communication and Synchronization – Shared Data Problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or Mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – RPCs. **(Lecture 08)**

Unit V

Real Time Operating Systems : LCD, Stepping Motor, ADC, DAC, LED, Push Buttons, Key board, Latch Interconnection, PPI Serial protocols, Parallel protocols and wireless protocols. Basic Features – Task Management Library at the System – Library Header File, Inter Process (Task) Communication Functions. **(Lecture 08)**

Course Outcomes:

- Understand what is a microcontroller, microcomputer, embedded system.
- Understand different components of a micro-controller and their interactions.
- Become familiar with programming environment used to develop embedded systems
- Understand key concepts of embedded systems like IO, timers, interrupts, interaction with peripheral devices
- Learn debugging techniques for an embedded system

Text Books:

1. Rajkamal, “Embedded Systems Architecture, Programming and Design”, Tata McGraw Hill.

2. Embedded System Design-Frank Vahid/Tony Givargis, John Willey.
3. Microcontroller (Theory and Applications) Ajay V Deshmukh, Tata McGraw-Hill.

Reference Books:

1. David E. Simon, “An Embedded Software Primer”, Pearson Education Asia, First Indian.
2. Microcontrollers (Architecture, Implementation & Programming) Kenneth Hintz, Daniel Tabak, Tata McGraw-Hill.

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours) Computer Science -Semester VI
Distributed Computing**

Course Code: CSC608

L-3, T-1, P-0,C-4

Objectives: Understand the concept of Distributed computing, organization of Distributed Computing, advantages and limitations of Distributed Computing.

Course Contents

UNIT I

Introduction to Distributed Systems, Design Goals, Types of Distributed systems, system architectures and fundamental models, middleware, Threads, virtualization, client-Server Model, Code migration.

(Lecture 08)

UNIT II

Communication fundamentals, Remote Procedure Call, message oriented communication, and stream oriented communication, multicast communication.

(Lecture 08)

UNIT III

Synchronization: clock synchronization, logical clocks, mutual exclusion algorithms: centralized, decentralized, distributed and token ring algorithms, election algorithms.

(Lecture 08)

UNIT IV

Replication management: need for replication, consistency models: data centric and client centric consistency models, replica management, consistency protocols: continuous, primary-based, replicated-write and cache-coherence protocols.

(Lecture 08)

UNIT V

Fault tolerance: basic concepts and failure models, process resilience, reliable client-server and group communication, distributed commit recovery mechanisms.

(Lecture 08)

Course Outcomes:

- The student will explain various architectures used to design distributed systems, such as client-server and peer-to-peer.
- The student will build distributed systems using various inter-process communication techniques, such as remote method invocation, remote events, and tuple spaces.
- The student will build distributed systems using various techniques for tolerating partial failures, such as leasing and replication.
- The student will build distributed systems using various inter-process coordination techniques, such as distributed mutual exclusion, distributed monitors, and tuple spaces.
- The student will explain various distributed algorithms, such as logical clocks and leader election.
- The student will analyze and explain current distributed systems research literature

Text Books:

1. Distributed Systems, Principles and Paradigms by Andrew S. Tanenbaum and Maarten Van Steen, Pearson Education.
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.

Reference Books:

- 1."Advanced Operating System " Singhal&sivaratri.Tata McGraw-Hill Education

B.Sc.(Honours) Computer Science -Semester-VI
Advance Java

Course Code: CSC609

L-4,T-1, P-0,C-5

Unit-I

JDBC – JAVA Database Connectivity, Direct connection to Type 3 and Type 4 drivers, Servlets: Servlet Class hierarchy and life cycle methods, creating the servlet, implementing a servlet application, servlet API, Running a servlet on Apache Tomcat Server. **(Lecture 08)**

Unit-II

Managing Sessions and Handling Errors: Session Management in servlets, handling errors and exceptions in servlets, Inter servlet communication, Thread-safe servlets. **(Lecture 08)**

Unit-III

Java Server Pages - Understanding the working of Server side Scripting, JSP Components, Java beans and JSP concepts, JDBC and JSP, Configuring JSP Server (Apache Tomcat) , Using JSP Implicit objects, JSP Actions, JSP-Java bean Scope, JSP and MVC,JSTL, A sample website using JSP and Servlets.

Introduction to Struts2 Framework, Interceptors and Validation.Struts2 and AJAX **(Lecture 08)**

Unit-IV

J2EE Architecture in detail: EJB Architecture & Design, EJB Container and its services, working with EJB's – Session beans, Session beans and State, stateful and stateless session Beans, Entity Beans, Container Managed and Bean Managed persistence. **(Lecture 08)**

Unit-V

Hibernate: Introduction, comparing JDBC to Hibernate, Mapping System, Hibernate configuration, HQL Introduction, Introduction to Spring framework, Springs and AOP. **(Lecture 08)**

Course Outcomes:

- To learn advanced Java programming concepts like reflection, native code interface, threads, etc.
- To develop network programs in Java
- To understand Concepts needed for distributed and multi-tier applications
- To understand issues in enterprise applications development.

Text Books:

1. Jim Farley, William Crawford, O'Reilly and Associates, "Java Enterprise in a Nutshell".
2. Brett McLaughlin, O'Reilly, "Java and XML, Latest Edition.

Reference Books:

1. Elliott Rusty Harold and W. Scott Means, O'Reilly, "XML in a Nutshell".
2. James Cooper, "Java Design Patterns: A Tutorial", Addison Wesley.
3. GovindSesadri, "Enterprise java Computing: Application and Architectures", CambridgeUniversity Publications, 1999.
4. Pure JSP – James Goodwill – SAMS Techmedia

B.Sc.(Honours) Computer Science -Semester-VI
ASP.Net with Ajax

Course Code: CSC610

L-4,T-1, P-0,C-5

UNIT I

Review of .NET frameworks, Introduction to C#, Variables and expressions, flow controls, functions, debugging and error handling, OOPs with C#, Defining classes and class members.

Assembly, Components of Assembly, Private and Shared Assembly, Garbage Collector, JIT compiler. Namespaces Collections, Delegates, Enumeration and Events. Introduction to ASP.NET4:Microsoft.NET framework, ASP.NET lifecycle. **(Lecture 08)**

UNIT II

CSS: Need of CSS, Introduction to CSS, and Working with CSS with visual developer.

ASP.NET server controls Introduction, How to work with button controls, Textboxes, Labels, checkboxes and radio buttons, list controls and other web server controls, web.config and global.asax files. Programming ASP.NET web pages: Introduction, data types and variables, statements, organizing code, object oriented basics. **(Lecture 08)**

UNIT III

Validation Control: Introduction, basic validation controls, validation techniques, using advanced validation controls State Management: Using view state, using session state, using application state, using cookies and URL encoding Master Pages: Creating master pages, content pages, nesting master pages, accessing master page controls from a content page. Navigation: Introduction to use the site navigation, using site navigation controls. **(Lecture 08)**

UNIT IV

Databases: Introduction ADO.NET, using SQL data sources, Grid View Control, Details View and Form View Controls, List View and Data Pager controls, Using object datasources. ASP.NET Security: Authentication, Authorization, Impersonation, ASP.NET provider model Connected and Disconnected Mode. **(Lecture 08)**

UNIT V

LINQ: Operators, implementations, LINQ to objects, XML, Query Syntax. ASP.NET Ajax: Introducing AJAX, Working of AJAX, Using ASP.NET AJAX server controls,

JQuery: Introduction to JQuery, JQuery UI Library, Working of JQuery. **(Lecture 08)**

Course Outcomes:

- Display proficiency in C# by building stand-alone applications in the .NET framework using C#.
- Create distributed data-driven applications using the .NET Framework, C#, SQL Server and ADO.NET
- Create web-based distributed applications using C#, ASP.NET, SQL Server and ADO.NET
- Utilize DirectX libraries in the .NET environment to implement 2D and 3D animations and game-related graphic displays and audio.
- Utilize XML in the .NET environment to create Web Service-based applications and components.

Books:

Beginning Visual C# 2010, K. Watson, C. Nagel, J.H Padderson, J.D. Reid, M.Skinner, Wrox (Wiley) 2010. Murach's

ASP.NET 4 Web Programming with C# 2010, 4 Edition, Anne Boehm, Joel Murach, SPD. Beginning ASP.NET 4 in C# and VB, I. Spanjaars.

References:

ASP.NET 4.0 programming, J. Kanjilal, Tata McGraw-Hill.

Programming ASP.NET, D. Esposito, Microsoft Press (Dreamtech).

Visual C#.NET, Vijay Nicoel, TMH

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester VI
Cloud Computing

Course Code: CSC616

L-4, T-1, P-0, C-5

Objective: The main objective of this course is to teach the students what is cloud and how to use cloud computing. This course offers the students theoretical knowledge of cloud computing.

Course Content

Unit-I

Cloud Computing: Existing usage of cloud computing;

Cloud Computing Architectural Framework: Cloud: Benefits, Vocabulary, Essential characteristics, Deployment models, Service models, Multi-tenancy Cloud Computing threats, Cloud Reference Model.

(Lecture 08)

Unit II

Vendor Lock-in and Efforts at Standardization: Need of migration; Preventing vendor lock-in; Comparison chart.

Data Center Operations: The anatomy of cloud infrastructure, Data Center Operations, Security challenge, implement “Five Principal Characteristics of Cloud Computing, Data center Security Recommendations..

(Lecture 08)

Unit III

Cloud Economics and Capacity Management: Restricted choices; Capacity planning; Queuing and response time; Evidence based decision making; Instrumentation (measuring resource consumption); Bottlenecks; Key volume indicators.

(Lecture 08)

Unit IV

Cloud Reliability, Fault Tolerance and Response Time: Business continuity management: System reliability, Human factors; Case studies on designing for reliability; Concept of fault tolerance; Response time.

Internet Cloud Security: Introduction; Potential threats; Security as a service by cloud providers; Fraud theory and Intellectual property; Security engineering.

(Lecture 08)

Unit V

Traditional Security, Business Continuity, and Disaster Recovery: Risk of insider abuse, Security baseline, Customers actions, Contract, Documentation, Recovery Time Objectives(RTOs), Customers responsibility, **Case Study on Cloud Computing Applications:** Amazon’s cloud services (AWS).

(Lecture 08)

Course Outcomes:

- Current cloud computing technologies, including technologies for different cloud services.
- Large data processing in the cloud
- Resource management in the cloud
- Analyze the components of cloud computing showing how business agility in an organization can be created
- Critically analyze case studies to derive the best practice model to apply when developing and deploying cloud based applications.

Text Books:

1. David, E.Y. Sarna, *Implementing and Developing Cloud Computing Applications*, CRC Press.
2. Dimitris, N. Chorafas, *Cloud Computing Strategies*, CRC Press.

Reference Books:

1. Mather, T., *Cloud Security and Privacy: An Enterprise Perspective On Risks And Compliance*, O’Reilly.

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester VI
Concept of Green Technology

Course Code: CSC611

L-3,T-1,P-0,C-4

Unit-I

Introduction of Green Protocols: Need, Goal and Limitation of Green Technology, Principles of Green Technology with their explanations and examples. Sustainable development, atom economy, reduction of toxicity. **(Lecture 08)**

Unit-II

Relate Safety to Wind, Hydroelectricity, Fuel Cell, Solar and Biomass Technologies, Introduction to Wind Technology, Understand the Science of Wind Technology, Produce electrical energy via a wind-driven generator. Explore control mechanisms of wind-generated electricity. **(Lecture 08)**

Unit-III

Introduction to Hydroelectric & Fuel Cell Technologies, Understand the science of Hydroelectric & Fuel Cell Technologies, produce electrical energy through a hydroelectric system and through a fuel cell system. Explore control mechanisms of hydroelectricity and fuel cells; Build a hydrogen powered Car-Fuel cell X7. **(Lecture 08)**

Unit-IV

Introduction to Solar Technology, Understand the Science of Solar Technology, Understand basic electronics, understand how solar energy is collected and stored. **(Lecture 08)**

Unit-V

Introduction to Biomass Technology, Understand the science of Biomass and Bio fuel Technologies, Understand how Biomass is produced. **(Lecture 08)**

Course Outcomes:

- A critical understanding of current modes of energy generation and global resource management, their associated environmental impacts, and emerging green technology solutions
- An in-depth appreciation of the policy and legislative context nationally and globally relating to the development and deployment of green technologies
- Proficiency in the application of GIS (Geographical Information Systems) in relation to green technology solutions
- Knowledge and experience of green technology development and innovation, or novel application for an existing green technology, and factors determining its uptake by society.

Textbook:

1. Soli J. Arceivala, "Green Technologies", McGraw Hill Education.
2. S.K.Garg, "Environmental Studies and Green Technologies", Khanna Publication.
3. V. Sivasubramanian, "Environmental Sustainability Using Green Technology", CRC Press, First Edition, 2016.

Reference Books:

1. [David Dornfeld](#), "Green Manufacturing: Fundamentals and Applications (Green Energy and Technology)", Springer, 2012.
2. Francis daCosta, "Green Technologies: Concepts, Methodologies, Tools and Applications: 3 (Premier Reference Source) ", IGI Global; 1st edition, 2011.

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester VI
Social Implication of Information Technology

Course Code: CSC612

L-3, T-1, P-0,C-4

Course Contents

Unit-1

Importance of social dimensions of science and technology, global perspectives of technology on society, legal implications of advances in IT. **(Lecture 08)**

Unit-II

How do social and technical choices reshape access to people, services and technologies. Influencing factors such as geography of access, the architecture of networks, the power of receivers and senders and control over the content. **(Lecture 08)**

Unit-III

Social and economic role of eminent social scientists and IT professionals, Information Technology and the reach of boundaries of business and management, Redesigning of work place. **(Lecture 08)**

Unit-IV

The intelligence household, IT in course and education using digital devices, social and ethical implication, Privacy and surveillance in everyday life, impact of IT on culture. **(Lecture 08)**

Unit-V

Government challenges of technological, cyber crime laws. **(Lecture 08)**

Course outcomes:

Information and risk: Models including confidentiality, integrity and availability (CIA); concepts such as probability, consequence, harm, risk identification, assessment and mitigation; and the relationship between information and system risk

Threats and attacks: Threats, how they materialize, typical attacks and how those attacks exploit vulnerabilities

Cyber-security architecture and operations: physical and process controls that can be implemented across an organization to reduce information and systems risk, identify and mitigate vulnerability, and ensure organizational compliance

Secure systems and products: The concepts of design, defensive programming and testing and their application, to build robust, resilient systems that are fit for purpose

Cyber-security management: Understanding the personal, organizational and legal/regulatory context in which

Information systems could be used, the risks of such use and the constraints (such as time, finance and people) that may affect how cyber security is implemented

Text Books:

1. Dutton, W.H., “*Society on the line: Information politics in digital age*”, Oxford University Press.
2. “*Social, Ethical and Policy Implications of Information and Technology*”, by Linda L. Brennan, Victoria Johnson.
3. Castells M., “*The Internet Galaxy*”, Oxford University Press

Reference Books:

1. Teich, A.H., “*Technology and the future*”, Newyork s1. Martinpress.
2. <http://www.alteich.com>.
3. <http://www.students.ou.edu.C/Kara.C.chiodo-1/orwell.html>.

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours) Computer Science -Semester VI
Information Security and Cyber Law**

Course Code: CSC613

L-3, T-1, P-0,C-4

Objective:

The objective of this subject is to make the individual aware of cybercrimes and acquire a critical understanding of cyber laws in order to prevent their information systems from cybercrimes and to give the learners in depth knowledge of Information security Act and frame work for data security. It helps to develop the understanding of relationship between commerce and cyberspace.

Course Contents

Unit I

Introduction: History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing: Security Challenges in Mobile Devices, Authentication Service Security, Security Implication for organizations, Laptops Security Functions of various networking components- routers, bridges, switches, hub, gateway. **Lecture 08**

Unit II

Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles. Security Threats to E-Commerce, Virtual Organization, and Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. **Lecture 08**

Unit III

Physical Security: Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls. Access Control- Biometrics, Factors in Biometrics Systems, Benefits, and Criteria for selection of Biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges. **Lecture 08**

Unit IV

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies, Network Security: Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection. Virtual Private Networks: Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN. **Lecture 08**

Unit V

Laws, Investigation and Ethics: Cyber Crime, Information Security and Law, Types & overview of Cyber Crimes, Cyber Law Issues in E-Business Management, Overview of Indian IT Act, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Ethical hacking. **Lecture 08**

Course Outcomes:

- An overview of information security: confidentiality, integrity, and availability
- Malicious software (Viruses, trojans, rootkits, worms, botnets)
- Access control theory, access control matrix
- Information flow

- Security policies
- Cybercrime and computer crime
- Intellectual property, copyright, patent, trade secret
- Hacking and intrusion
- Privacy, identity theft.
- Network Intrusion detection and prevention systems
- Firewalls

Text Books:

1. Godbole, “Information Systems Security”, Willey.
2. Merkov, Breithaupt, “Information Security”, Pearson Education.

Reference Books:

1. Yadav, “Foundations of Information Technology”, New Age, Delhi.
2. Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.
3. Sood, “Cyber Laws Simplified”, McGraw Hill.
4. Furnell, “Computer.

***Latest editions of all the suggested books are recommended.**

**B.Sc.(Honours) Computer Science -Semester VI
ENTERPRISE RESOURCE PLANNING SYSTEMS**

Course Code: CSC614

L-3, T-1, P-0,C-4

Objective:

- Comprehend the technical aspects of ERP systems.
- Learn concepts of reengineering and how they relate to ERP system implementations.
- Be able to map business processes using process mapping techniques.
- Understand the steps and activities in the ERP life cycle.
- Be able to identify and describe typical functionality in an ERP system.

Course Contents

Unit-I

ERP Introduction: An Overview Integrated Management Information, Integrated Data Model, ERP Introduction , Evolution of ERP, The Structure of ERP, Conceptual Model of ERP, Benefits of ERP, ERP and E-business. **(Lecture 08)**

Unit-II

ERP and Related Technologies: Business Process Reengineering, Data Warehousing, Data Mining, Online Analytic Processing, Product Life Cycle Management, Supply chain Management, Management Information System, Decision Support System, Executive Information System. **(Lecture 08)**

Unit-III

ERP: Functional Modules-Introduction, Functional Modules of ERP Software, ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the

Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring. **(Lecture 08)**

Unit-IV

ERP for Industries: Market overview of ERP, ERP for petroleum, GAS companies, ERP for Automobile Industry, ERP for FMCG, ERP for Mining industry ERP for retail, ERP for healthcare, ERP for Educational Institution, ERP for Telecom, ERP for banks, ERP for Insurance companies. **(Lecture 08)**

Unit-V

ERP & E-Commerce: Future Directives in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. **(Lecture 08)**

Course Outcomes:

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

- Understanding basic concepts and applications of planning resources utilizing Enterprise Resource Planning (ERP) systems.
- Apply methods and techniques of supply chain management, Management Information systems and understanding the concepts of data warehouse and data mining.
- Understanding the various aspects of implementation of ERP
- Understanding the industrial uses and advantages of ERP
- Understanding E-Commerce with reference to ERP, Its success and failure factors & integration of ERP in organization.

Text Books:

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill
2. Rahul V. Altekar “Enterprisewide Resource Planning”, Tata McGraw Hill,

Reference Books:

1. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI.
2. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology.
3. Mary Summer, “Enterprise Resource Planning”- Pearson Education.
4. Ellen Mon, Bret Wagner "Concepts in ERP", Second Edition of Cengage Course.

***Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester VI
Big Data Analytics

Course Code:CSC615

L-3, T-1, P-0,C-4

Objective

This course provides practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including Map Reduce and Hadoop and its ecosystem.

Course Content

Unit I

INTRODUCTION TO BIG DATA: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce. **(Lecture 08)**

Unit-II

INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization. **(Lecture 08)**

Unit-III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., Name Node, Secondary Name Node, and Data Node, Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance. **(Lecture 08)**

Unit-IV

HIVE AND HIVEQL, HBASE:Hive Architecture and Installation, Comparison with Traditional Database, HiveQL – Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBaseconceptsAdvanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper. **(Lecture 08)**

Unit-V

Big Data Analytics: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists - Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders. **(Lecture 08)**

Course Outcomes:

- Understand the concept and challenge of big data and why existing technology is inadequate to analyze the big data
- Collect, manage, store, query, and analyze various form of big data; and
- Gain hands-on experience on large-scale analytics tools to solve some open big data problems
- Understand the impact of big data for business decisions and strategy

Text Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill.

Reference Books:

1. Tom White, “HADOOP: The definitive Guide” , O Reilly .
2. VigneshPrajapati, “Big Data Analytics with R and Haoop”, Packet Publishing .
3. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press.

4. JyLiebowitz, "Big Data and Business analytics",CRC press.
 5. Chris Eaton, Dirk Deroos, Tom Deutsch et al., "Understanding Big Data", McGrawHill.
- *Latest editions of all the suggested books are recommended.**

B.Sc.(Honours) Computer Science -Semester VI
Project Lab-Under the Super vision of Project Guide (In house Development)

Course Code CSC653

L-0, T-0, P-4, C-2

Course Content

Project work to be carried out on either of the following Technologies:

- 1. MATLAB**
- 2. Android Programming**
- 3. Programming in Python**
- 4. PHP Programming**
- 5. Java Programming**
- 6. Microsoft ASP.Net**

Evaluation:

Project Guide/Supervisor of the project will be nominated by Head of Department and the internal evaluation shall be done by three faculty members committee nominated by the Director of the college.

The external evaluation will be done by the external examiner arranged by examination branch of the university.

Course Outcomes:

- Students were expected to develop products using different languages using their class works
- Students were gaining knowledge about product development and different stages of product development.

Assessment criteria:

Internal: 50 marks

Internal review by the committee - 50marks

External: 50 marks

By External examiner appointed by the University – 50 marks

Note:

The evaluation format for internal assessment as in Annexure I

The evaluation format for external assessment as in Annexure II

Course Content

1. Java
2. Installation of JDK 1.8
3. Installation of NetBeans 7.1
4. Using Netbeans
- 5. Programs based on JDBC with backend as MySql/Oracle 10g.**
6. Window based application development with back end support.
7. Programs based on web based application development.
8. Business Logic development using servlets.
9. Designing page using JSP, customtags, JSTL.
10. Development of EJB Component.
11. Programs based on JSP and AJAX.
12. Programs to implements MVC Architecture.

Course Outcomes:

- Learn the Internet Programming, using Java Applets
- Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit
- (AWT) & Swings
- Apply event handling on AWT and Swing components.
- Learn to access database through Java programs, using Java Data Base Connectivity
- (JDBC)
- Create dynamic web pages, using Servlets and JSP.
- Make a reusable software component, using Java Bean.
- Invoke the remote methods in an application using Remote Method Invocation (RMI)
- Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).
- Develop Stateful, Stateless and Entity Beans.
- Use Struts frameworks, which give the opportunity to reuse the codes for quick development.
- Map Java class

B.Sc.(Honours) Computer Science -Semester-VI
ASP.Net with Ajax Lab

Course Code: CSC656

L-0,T-0, P-4,C-2

Course Contents

1. The use of sequence, conditional and iteration construct.
2. Various operators like logical, arithmetical, relational, etc.
3. Overloading of various operators.
4. Use of Static Member functions, optional arguments.
5. Use of destructor and various types of constructor.
6. Various forms of Inheritance.
7. Use of Interface in multiple inheritance, virtual and override concept, delegates.
8. File operation.
9. Create windows based application with connected and disconnected architecture.
10. Simple web application using ASP Net.
11. Use of Active X controls.
12. Create web application using ASP.Net with Ajax and Ajax Control Toolkits provided by Microsoft.
13. Create Window application using ASP.Net with Ajax and Ajax Control Toolkits provided by Microsoft.

Course Outcomes:

At the end of this class, the learner will be able to:

- Design and Develop ASP.NET Server AJAX applications with the ASP.NET AJAX the Partial Page Update framework
- Show progress of Partial Page Update with the UpdateProgress Control
- Handle exceptions of Partial Page Updates either on the client or on the server
- Cancel or abort a Partial Page Update in progress
- Set a recurring asyncpostback with the Timer control

Note: Students are advised to develop a small project illustrating the handling of database and screens in order to fully understand the C#.

EVALUATION SHEET
B.Sc.(Honours) Computer Science -Semester VI

(To be filled by the Internal Examiners only)

Subject Code: CSC653

Subject: Project Lab

Name of Candidate:

Roll No:

Please evaluate out of marks as indicated.

S.No	Details	Maximum Marks	Examiner I	Examiner II	Examiner III	Average
			Marks	Marks	Marks	Marks
1	Problem Clarity	5				
2	Technical aspects of the system (scope, objective ,tools used)	10				
3	Software Engineering Concepts & Models	10				
4	Methodology (Database design/ Business Process design / GUI Design)	10				
5	Confidence / Body Language	5				
6	Presentation Skills	5				
7	Assessment Of Accuracy using Testing Tools	5				
	TOTAL	50				
	Signature of Internal Examiners with date	-----				
		Average marks out Of 50				
	Signature of the Director with date					

EVALUATION SHEET**B.Sc. (Honours) Computer Science -Semester VI***(To be filled by the External Examiners only)***Subject Code: CSC653****Subject: Project Lab****Name of Candidate:****Roll No:***Please evaluate out of marks as indicated.*

<i>S.No</i>	<i>Details</i>	<i>Maximum Marks</i>	<i>Examiner I</i>
			<i>Marks Awarded</i>
1	<i>Problem Clarity</i>	5	
2	<i>Technical aspects of the system (scope, objective ,tools used)</i>	10	
3	<i>Software Engineering Concepts & models</i>	10	
4	<i>Methodology (Database design/ Business Process design / GUI Design)</i>	10	
5	<i>Confidence / Body Language</i>	5	
6	<i>Presentation Skills</i>	5	
7	<i>Assessment Of Accuracy using Testing tools</i>	5	
	<i>TOTAL</i>	50	
	<i>Signature of External Examiner with date</i>		