DAV UNIVERSITY JALANDHAR

FACULTY OF SCIENCE

Course Scheme & Syllabus

For

Bachelor of Computer Applications
(Three Years Degree Course)

(Programme ID-32)

(As per Choice Based Credit System)

1st TO 6th SEMESTER

Eligibility: 10+2 (Any Stream) with 50% marks (For SC/ST: 45% Marks)

Syllabi Applicable for 2022 Batch

Bachelor of Computer Applications
Syllabus 2022-25

Semester 1

S.No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	CSA103	Principles of Digital Electronics	Core	4	0	0	**4**
2	CSA104	Office Automation Laboratory	Core	0	0	4	**2**
3	CSA110	Computer Fundamentals and Office Automation	Core	4	0	0	**4**
4	CSA111	Algorithm and Programming Logic Design	Core	4	0	0	**4**
5	CSA113	Workshop on Desktop Publishing	Core	0	0	4	**2**
6	**Generic Elective I**		GE				**4**
7	ENG151B	Communication Skills	AECC	3	0	0	**3**
8	ENG152A	Communication Skills Laboratory	AECC	0	0	2	**1**
	Total						**24**

GE (Generic Elective-I) (Choose one)

S.No	Paper Code	Course Title	L	T	P	Cr
1	MGT101	Principles & Practices of Management	3	1	0	4
2	MGT151A	Fundamentals of Management	4	0	0	4
3	MGT155	Fundamentals of Accounting and Finance	4	0	0	4

Semester 2

S.No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	CSA105	Principles of Programming and Algorithms using C	Core	4	0	0	**4**
2	CSA106	Web Designing	Core	4	0	0	**4**
3	MTH190A	Mathematical Foundation of Computer Science	Core	4	0	0	**4**
4	EVS100	Environment Studies	AECC	4	0	0	**4**
5	SGS107	Human Values and General Studies	AECC	4	0	0	**4**
6	CSA108	C Programming Laboratory	Core	0	0	4	**2**
7	CSA109	Web Designing Laboratory	Core	0	0	4	**2**
	Total						**24**

Semester 3

S.No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	CSA201	Computer Oriented Numerical and Statistical Techniques	Core	4	0	0	**4**
2	CSA202	Object Oriented Programming Structures	Core	4	0	0	**4**
3	CSA203	Database Concepts	Core	4	0	0	**4**
4	CSA204	Computer System Architecture	Core	4	0	0	**4**
5	CSA211	Information Systems	Core	4	0	0	**4**
6	CEC101	Community Engagement Course	Core	1	0	0	**1**
	CEC102	Community Engagement Course	Core	0	0	1	**1**
7	CSA207	Database Concepts Laboratory	Core	0	0	4	**2**
8	CSA208	Object Oriented Programming Structures Laboratory	Core	0	0	4	**2**
9	CSA221	Workshop on E-Marketing	Core	0	0	4	**2**
	Total						**28**

Semester 4

S.No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	CSA209	Data Structures	Core	4	0	0	**4**
2	CSA213	Software Engineering	Core	4	0	0	**4**
3	CSA210	Programming in C#	Core	4	0	0	**4**
4	CSA217	System Software	Core	4	0	0	**4**
5	CSA218	Computer Networks	Core	4	0	0	**4**
6	CSA216	Programming in C# Laboratory	Core	0	0	4	**2**
7	CSA219	Data Structures Laboratory	Core	0	0	4	**2**
8	CSA220	Computer Networks Laboratory	Core	0	0	4	**2**
	Total						**26**

Semester 5

S.No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	CSA303	Operating Systems	Core	4	0	0	4
2	CSA315	Programming in Python	Core	4	0	0	4
3	CSA316	Discrete Mathematics	Core	4	0	0	4
4	**Discipline Specific Elective-I**		DSE	4	0	0	4
5	CSA317	Web Engineering using ASP.NET	Core	4	0	0	4
6	CSA312	Web Engineering using ASP.NET Laboratory	Core	0	0	4	**2**
7	CSA318	Programming in Python Laboratory	Core	0	0	4	**2**
8	CSA319	Workshop on App Development	Core	0	0	4	**2**
	Total						**26**

DSE (Discipline Specific Electives)-I (Choose One)

S.No	Paper Code	Course Title	L	T	P	Cr
1	CSA314	Data Warehousing and Mining	4	0	0	4
2	CSA320	Basics of Artificial Intelligence	4	0	0	4
3	CSA321	Introduction to Internet of Things	4	0	0	4

Semester 6

S.No	Paper Code	Course Title	Course Type	L	T	P	Cr
1	CSA302	Core JAVA	Core	4	0	0	4
2	CSA309	Computer Graphics and Multimedia	Core	4	0	0	4
3	**Discipline Specific Elective-II**		DSE	4	0	0	4
4	CSA308	Core JAVA Laboratory	Core	0	0	4	2
5	CSA311	Computer Graphics Laboratory	Core	0	0	4	2
6	CSA313	Major Project*	Core	0	0	20	10
	Total						**26**

DSE (Discipline Specific Electives)-II (Choose One)

S.No	Paper Code	Course Title	L	T	P	Cr
1	CSA322	Digital Image Processing	4	0	0	4
2	CSA323	Machine Learning	4	0	0	4
3	CSA324	Cloud Computing	4	0	0	4

*The Major Project will be of 20 to 24 weeks duration. It will include the development of application/system software. For evaluation, 20% weightage will be given to the synopsis of the project and 80% weightage will be given to the Viva, Project Execution, and Project Report.

Course Title: Principles of Digital Electronics
Course Code: CSA103
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To give knowledge about the various electronics components and digital circuits to the students and designing of various building blocks of computer system. After studying this subject students will be able to easily understand the internal working of digital electronic circuits.

Course Outcomes:

CO-1	To provide the knowledge about the various electronics components and digital circuits to the students and designing of various building blocks of computer system concepts.
CO-2	To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits**.**
CO-3	To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.
CO-4	To design and analysis of the digital circuit and system. After studying this subject students will be able to easily understand the internal working of digital electronic circuits.

UNIT-A **15 Hours**

Fundamentals

- Definitions of Digital Signals, Digital Waveform
- Digital Logic, Gate propagation delay time
- Digital Operations, Digital Integrated Circuits, Digital IC signal levels.

Number System

- Decimal Number System, Binary Number System,
- Octal Number System, Hexadecimal Number System,
- Conversion from One Number System to another,
- Arithmetic Operation without Changing the Base, 1‟s Complement and 2‟s Complement.

Logic Gates

- AND, OR, NOT, NAND, NOR, XOR, XNOR, NAND & NOR as Universal Gates, Logic Gates Applications.

UNIT-B **12 Hours**

Boolean Algebra

- Introduction, Theorems, Simplification of Boolean Expression using Boolean
- Algebra,
- SOP & POS Forms, Realization of Boolean Expression using Gates,
- KMaps, Simplification of Boolean Expression using KMaps.

Combinational Logic Circuits

- Half Adder & Half Subtractor, Full Adder & Full Subtractor,
- Parallel Binary Adder, Binary Adder/Subtractor.

UNIT-C **10 Hours**

Combinational Logic Circuits

- Multiplexers & Demultiplexers, Implementation of Boolean equations using Multiplexer and Demultiplexer
- Encoders & Decoders.

Sequential Logic Circuits

- Latch, FlipFlops RS FlipFlop, JK FlipFlop, MasterSlave JK FlipFlop
- Race Condition, Removing RaceCondition, D FlipFlop, T FlipFlop, Applications of FlipFlops

UNIT-D **8 Hours**

Semiconductor memories

- Introduction, Static and dynamic devices, read only & random access memory chips, PROMS and EPROMS Address selection logic.
- Read and write control timing diagrams for ICs.

Reference Books:

1. Malvino, *Digital Computer Electronics*, Delhi: McGraw Hill, Second Edition.
2. Mano D. Morris, *Digital Logic & Computer Design*, New Delhi: PHI Second Edition
3. Halkias Millman, *Integrated Electronics*, Delhi: McGraw Hill.
4. Hodges D.A. & Jackson H.G., *Analysis and Design of Integrated Circuits*, New York: International McGraw Hill, , 1983.
5. Ujjenbeck, John, *Digital Electronics: A Modern Approach*, New Delhi: Prentice Hall, 1994

Course Title: Computer Fundamentals and Office Automation
Course Code: CSA110
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology. The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology and to make them proficient in the use of computer applications such as word, excel and presentation slides relevant to their upcoming project and their reports.

Course Outcomes:

CO-1	Illustrates different components of computer, its Characteristics, generations and application. Explain different number system used in computer system and binary arithmetic.
CO-2	Introduce computer memory and I/O devices. Explain different computer languages and types of computer operating system.
CO-3	Discusses DOS history and various DOS commands. Introduce features of MS word and its usage.
CO-4	Introduce excel worksheet and various excel functions. Explain use of MS-Power point and MS-Access

UNIT-A

Computer Fundamentals **12 Hours**

- Block Structure of a Computer, Characteristics of Computers
- Computer generations, Applications of Computers.
- Classification of Computers on the Basis of size and chronology.

Number System

- Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions.

Binary Arithmetic

- Addition, subtraction and multiplication

UNIT-B **12 Hours**

Memory Types

- RAM, ROM, Cache and Secondary memory.

Input and Output Devices

- Keyboard, Mouse, Monitor, Light pen, Joystick, Mouse, OCR, OMR, MICR.
- Impact, nonimpact, working mechanism of Drum printer, Dot Matrix printer, Inkjet printer and Laser printer, plotters.

Computer languages and operating System Concepts

- Machine language, assembly language, higher level language, 4GL and introduction to Compiler, Interpreter, Assembler.
- Batch, multiprogramming, time sharing, multiprocessor operating system, online and real time operating system, distributed operating system.

UNIT-C **13 Hours**

DOS

- DOS – History, Internal and External Commands, Batch Files

MS Word

- Salient Features Of MS WORD,
- Creating, saving, opening and printing files, formatting pages, paragraphs and sections, checking Spelling and grammar; creating lists and numbering.
- Headings, styles, fonts and font size. Finding and replacing text, inserting page breaks, page numbers, symbols, images and dates.
- Using tables, header, footer. Using mail merge features.

UNIT-D **8 Hours**

Excel

- Excel Worksheet, Data Entry, Editing, Cell Addressing Ranges
- Copying & Moving Cell Content, Inserting and Deleting Rows and Column, Column Formats, Printing, Creating, displaying charts
- Working with functions - Date and time function, Statistical function, Mathematical and Trigonometric functions, Text function, Logical functions.

MS–Power Point

- Presentation overview, entering information, Presentation creation, opening and saving presentation, using transitions and animations.

MS–Access

- Creating a Database using MS Access, Basic Tables, Using Queries, Using the Auto Form Feature, Form Design, Using the Auto Report Feature, Report Design, Copying Data, Freezing Columns, Printing Tables, Printing Reports, Sorting Records, Using the Filter Sorts, Renaming Columns

Reference Books:

1. Sinha, P.K. and Sinha, P., *Foundations of Computing*. New Delhi: BPB First Edition, 2002.
2. Norton Peter , *Introduction to Computers*, McGraw Hill.
3. Rajaraman V, *Fundamentals of Computers*, New Delhi: Prentice Hall of India, Second Edition, 1996.
4. Jain Satish , *MSOffice 2010 Training Guide*, Delhi : BPB Publications, 2010
5. Shelly G. B , Cashman Thomas J., and Vermaat Misty E., *Microsoft Office Word 2007: Complete Concepts and Techniques*, New Delhi:Cengage Learning, 2007

6. Subramanian N, *Introduction to Computers,* Noida, UP, India : Tata McGraw-Hill, 1989
7. Cyganski D, Orr J A,*Information Technology Inside and Outside,* New Jersey USA : Pearson Education 2002.

Course Title: Algorithm and Programming Logic Design
Course Code: CSA111
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To study the various techniques of problem solving using structured programming and step wise refinement. The objective of the course is to design programs using pseudocode and participate in hands-on debugging, testing, and documenting activities. The course includes principles of programming, the logic of constructing a computer program, and the practical aspects of integrating program modules. Algorithms are used to demonstrate programming as an approach to problem solving.

Course Outcomes:

CO-1	To understand the basic concepts of algorithms and analyze the performance of algorithms.
CO-2	To learn Program Design Methodology and Sequential and Selection Programming Structures.
CO-3	To understand the various Repetition Programming Structures.
CO-4	To explore the Advanced Variable Types and Definitions and Modularization**.**

UNIT-A

Problem solving and Algorithm **12 Hours**

- Concept : problem solving
- Problem solving techniques (Trial & Error, Brain storming, Divide & Conquer)
- Steps in problem solving (Define Problem, Analyze Problem, Explore Solution)
- Algorithms and Flowcharts (Definitions, Symbols)
- Characteristics of an algorithm
- Time complexity: Big-Oh notation, efficiency
- Simple Examples: Algorithms and flowcharts (Real Life Examples)

UNIT-B

Program Design Methodology **12 Hours**

- Procedural versus Object oriented programming
- Introduction to pseudocode
- How to write pseudocode
- Conditionals in pseudo-code

Sequential and Selection Programming Structures

- Sequential execution
- Boolean logic
- Simple selection algorithms
- Multiple selection algorithms
- Nested selection algorithms

UNIT-C **10 Hours**

Repetition Programming Structures

- Repetition statements
- Repetition structures

  - Repetition using the DOWHILE structure
  - Repetition using the REPEAT…UNTIL Structure
  - Counted Repetition
- Repetition algorithms
- Looping
- Nested control structures

UNIT-D **11 Hours**

Advanced Variable Types and Definitions

- Complex variables
- Variable usage
- Arrays
- Arrays and variables
- Pseudo code for common array operations
- Single dimensional array
- Multi dimensional array.

Modularization

- Hierarchy of charts or structure charts
- Further Modularization
- Communication between modules
- Using parameters in program design
- Steps in modularization
- Programming examples using modules
- Steps in Modularization
- Module cohesion
- Module coupling
- Scalability

Reference Books:

1. Sprankle, M & J. Hubbard, *Problem solving and programming concepts*, 9th Edition. NJ:Prentice Hall, 2012.
2. Gaddis, T., *Starting out with programming logic and design*, 3rd Edition. Boston:Addison Wesley 2012.
3. Venit, S. & E. Drake, *Prelude to programming: Concepts and design*, 5th Edition. Boston:Addison Wesley, 2011.
4. R.G.Dromy. *How to Solve it by Computer*, 3rd Edition, New Delhi: Pearson Education, 2007.

Course Title: Basic Communication Skills
Course Code: ENG151B
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
3	0	0	3	75

Course Objective:

- To enhance students' vocabulary and comprehensive skills through prescribed texts.
- To hone students' writing skills.

Course Outcomes:

CO-1	Students will be able to apply the concepts of grammar in socio-cultural context.
CO-2	Students will be able to perform basic writing tasks in order to enhance their communication skills.
CO-3	Students will recapitulate the concepts of Parts of Speech and Modals so as to improve communication.
CO-4	Students will be able to understand the relationship between Society and Language through reading and analyzing selected works.

Unit – A Applied Grammar (Socio-Cultural Context)

- Tenses
- Passives
- Reported/Reporting Speech

Unit – B Reading (Communicative Approach to be Followed)

- Nissim Ezekiel: "The Patriot" (Poem)
  (Sub-topics: Basic Introduction to Indianisms and Difference between Indian English & Standard English)

Writing

- Paragraph Writing : Topic Sentence, Inductive logic and Deductive logic
- Essays: Narrative, Descriptive, Expository and Persuasive
- Notice: Format, Characteristics and 5 W's,

Unit-C- Applied Grammar (in Socio-Cultural Contexts)

- Parts of Speech: Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction and Interjection
- Modals: Can, Could, May, Might, Will, Would, Shall, Should and Must

Unit-D- Reading (Communicative Approach to be Followed)

- Alleen Pace Nilsen: "Sexism in English" (Prose)
  (Sub-topics: Relationship between Society & Language and Sexist Language)

Writing

- Letter Writing: Formal and Informal

Teaching Methodology:

a. **Grammar:** Grammar must be taught descriptively in socio-cultural contexts. The contextual teaching of grammar helps a learner understand the application of grammar rules in real life situations. The learner who learns grammar in isolation is unable to use the language fluently, whereas the learner who learns grammar in context uses the language confidently and fluently in real life situations.

b. **Literary Texts:** Communicative approach should be followed to teach the texts. Classroom activities guided by the communicative approach aim to produce meaningful and real communication at all levels. As a result, there may be more emphasis on skills than systems. Lessons are more learner-centred, and authentic materials may be used to facilitate the teaching-learning process. Teachers can introduce the topic or theme of the text, pre-teach essential vocabulary items and use prediction tasks to arouse the interest and curiosity of students.

c. **Writing**: Some of the strategies that should be adopted are as follows:

- regularly assign brief writing exercises in your classes.
- Provide guidance throughout the writing process, i.e. Pre-Writing, Drafting, Revising, Editing, and Publishing.
- Give students opportunities to talk about their writing.
- Encourage students to revise their work.

Testing: The examinations will be conducted as per the norms of the university.

Suggested Readings:

1. *Dulai, Surjit S. "NISSIM EZEKIEL and the Evolution of Modern Indian English Poetry : A Chronology". Journal of South Asian Literature,2000.*
2. Eschholz, Paul and Rosa, Alfred (ed.), *Subject and Strategy*. NY: St. Martin's Press, 1978.
3. Ezekiel, Nissim. *Collected Poems 1952-1988*. New Delhi: Oxford University Press, 1999.
4. Hosler, Mary Margaret. *English Made Easy*. Delhi: McGraw, 2013.
5. Koneru, Aruna. *Professional Communication*. Delhi: McGraw, 2008.
6. Mahanand, Anand. *English for Academic and Professional Skills*. Delhi: McGraw, 2013.
7. Melvin, Jacqueline. English Grammar Reference Book: Grammar & Error Correction Guide AND Phrasal Verb Book.Kindle Edition ,2015.
8. Rani, D Sudha, TVS Reddy, D Ravi, and AS Jyotsna. *A Workbook on English Grammar and Composition*. Delhi: McGraw, 2016.
9. Rizvi, M. Ashraf. *Effective Technical Communication*. Delhi: McGraw, 2018.
10. Sharma, R.C. and Krishna Mohan. *Business Correspondence and Report Writing*. Delhi: McGraw, 2013.
11. Tyagi, Kavita and Padma Misra. *Basic Technical Communication*. Delhi: PHI Learning, 2013.

Audio-Visual Materials:

1. BBC Learning English. "Grammar" (A Series of 64 videos). Online video clip. YouTube. YouTube, 7 July 2015. Web. 22 April 2019.

2. BBC Learning English. “RP phonemes: pronunciation tips.” Online video clip. YouTube. YouTube, 16 Aug. 2014. Web. 22 April 2019.
3. IIT Kanpur. “Communication Skills” (A Series of 40 videos, NPTEL). Online video clip. YouTube. YouTube, 6 Jan. 2014. Web. 22 April 2019.
4. IIT Kanpur. “Developing Soft Skills and Personality” (A Series of 48 videos, NPTEL). Online video clip. YouTube. YouTube, 14 Sept. 2016. Web. 22 April 2019.
5. IIT Madras. “Better Spoken English” (A Series of 38 videos, NPTEL). Online video clip. YouTube. YouTube, 10 July 2013. Web. 22 April 2019.
6. IIT Madras. “Technical English for Engineers” (A Series of 38 videos, NPTEL). Online video clip. YouTube. YouTube, 14 Jan. 2016. Web. 22 April 2019.
7. IIT Roorkee. “Effective Writing” (A Series of 24 videos, NPTEL). Online video clip. YouTube. YouTube, July 2018. Web. 22 April 2019.
8. IIT Roorkee. “Soft Skills” (A Series of 60 videos, NPTEL). Online video clip. YouTube. YouTube, July 2018. Web. 22 April 2019.
9. UChicago Social Sciences. “Leadership Lab: The Craft of Writing Effectively.” Online video clip. YouTube. YouTube, 26 June 2014. Web. 22 April 2019.

Course Title: Basic Communication Skills Lab
Course Code: ENG152A
Course Duration: 30 Hours

L	T	P	Credits	Marks
0	0	2	1	25

Course Objective:

- To improve fluency in speaking English.
- To promote interactive skills through Group Discussions and role plays.

Course Outcomes:

CO-1	Students will have developed listening skills.
CO-2	Students will be able to articulate words and sentences clearly and efficiently.
CO-3	Students will be able to pronounce clearly and correctly.
CO-4	Students will show confidence in public speaking projects.

Unit-A **Speaking and Listening**
1. IPA for Language Learning - Basic Phonetics
2. Movie-Clippings
3. Role Plays
4. Group Discussions
5. Mock Interviews

Project File: Each student will prepare a project file on any of the topics given by their class teacher. Students should be able to justify the contents of their scrap files. They must acknowledge all the sources of information in their scrap files. The files must be handwritten, not typed.
Testing: The end term lab examination will be conducted as per the norms of the university. The distribution of marks in the end-term lab examination is as follows:

Component	Weightage
Project File Marks will be given for originality, creativity and presentation. Students will also receive credits for their command on the language.	**30 %**

Lab. Activity It may include dialogue writing (Dialogue to Prose and Prose to Dialogue), writing about a picture/some object, writing a report, writing on a topic of general interest, listening exercise, English phonetic exercise, etc. It will be decided by examiners on the spot.	**30%**
Viva Voce Questions will be based on the project file. Examiners may ask other non-technical questions related to students' lives and interests.	**40%**
Total	**100%**

Course Title: Principles and Practices of Management
Course Code: MGT101
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: Student will learn about the development of management theory and will understand the importance of management. The course also aims at explaining the basic functional elements of management.

Course Outcomes:

CO-1	Understand various functions and functional areas of management and preview the contributions made by different contributors in the management.
CO-2	Outline the concept of business environment for planning and organizing and formulating organization structures.
CO-3	Examine the functions of staffing and tools of directing, and controlling.
CO-4	Understand emerging issues of management

Unit – A **11 Hours**

- Meaning, nature, scope and importance of management
- Levels of management, Managerial roles
- Principles of functional management
- Evolution of management thought, contributions of F.W Taylor, Henry Fayol, Elton Mayo, Peter Drucker
- Professionalization of Management

Unit – B **12 Hours**

- Planning- Meaning, need & importance, Fundamentals & components of planning
- Planning: Types, process
- Concept of MBO, Advantages & Limitations of MBO
- Decision Making: Concept and process
- Organizing: Concept, significance, processes, Types of organisations
- Span of control. Authority and Responsibility relationships, Delegation
- Decentralization and Departmentation

Unit – C **11 hours**

- Direction & Coordination- Meaning, features, Tools & Techniques
- Leadership- Concept, importance, role & skills
- Communication and supervision
- Controlling- Nature, concept, process, types, scope, importance
- Controlling by exception. Controlling techniques. Key problems in controlling

Unit – D **11 hours**

- Emerging issues in management: American and Japanese styles
- TQM, Six-sigma, MIS, QWL.
- Strategic Management- Concept & process, SWOT analysis, Porter 5-forces model.
- Creativity and innovation.
- Managerial ethics: need, importance, Corporate social responsibility:

concept, need, tools

Text Book:

1. Rudani Ramesh, *Principles of Management*, Delhi: Tata, McGraw-Hill Education, 1st Edition 2013

Reference Books::

1. Koontz H & Weihrich, *Essentials of Management*, Delhi: Tata, McGraw-Hill 9th Edition 2013
2. Prasad L M, *Principles and Practices of Management*, New Delhi: Sultan Chand & Sons,
3. Stoner J A F, Freeman R E and Gilbert D R, *Management*, New Delhi: Pearson Education, 6th Edition (2004)

Course Title: Fundamentals of Management
Course Code: MGT151A
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The course aims at developing an appreciation about the principles, functions of management and functioning of professional organisations.

Course Outcomes:

CO-1	Understand basic terminology and concepts used in management
CO-2	Identify and apply skills and functions necessary to be an effective and efficient manager
CO-3	Interpret the roles of various managerial functions in managing organizations
CO-4	Know the importance of communication and control for the effective running of an organization

Unit – A **12 Hours**

- Introduction to business management- Definition of management, characteristics of management, management as an art, science and profession, universality of management, levels of management, management process, managerial roles and skills, functional areas of management.
- Planning- Introduction, planning and plan, strategy and strategic planning, main components of plan, vision, mission, purpose, objectives, goals and targets, Management by Objectives (MBO)

Unit – B **12 Hours**

- Forecasting: Meaning, process and importance, Decision-Making Process and types of decisions.
- Organizing- Definition, characteristics, organizing process, authority, responsibility, power, delegation, decentralization, departmentation, span of control, organization chart and manuals. Forms of Organization Structure

Unit – C **11 hours**

- Staffing- Introduction, factors affecting and qualities of good staffing, manpower planning, recruitment and selection.
- Leadership- Characteristics, importance, style, role, quality and skills of leader.
- Directing and Co-ordination- meaning, Fundamentals of motivation, motivation theories : Maslow's need hierarchy, Herzberg's Two-Factor Theory of Motivation, McGregor's Theory X and Theory Y.

Unit – D **10 hours**

- Communicating- Definition, Characteristics, Communication process, importance and types of communication, barriers to communication.
- Controlling- Meaning, characteristics, scope, control process, types of control, designing effective control systems.

Text Book:

1. Rudani Ramesh, *Principles of Management*, Delhi: Tata, McGraw-Hill Education, 1st Edition 2013

Reference Books:

1. Koontz H & Weihrich, *Essentials of Management*, Delhi: Tata, McGraw-Hill 9th Edition 2013
2. Prasad L M, *Principles and Practices of Management*, New Delhi: Sultan Chand & Sons, New Delhi
3. Stoner J A F, Freeman R E and Gilbert D R, *Management*, New Delhi: Pearson Education, 6th Edition (2004)

Course Title: Fundamentals of Accounting & Finance
Course Code: MGT155
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To develop the understanding of the framework of basics of accounting and finance.

Course Outcomes:

CO-1	Understand basic Accounting
CO-2	Identify and apply skills to work with Journal, Ledger, Trial Balance and Final accounts.
CO-3	To understand the concept of Business finance, Sources of finance, Cost of capital, Investment decisions.
CO-4	To Learn Investment decisions, Working Capital Management and Dividend policy and decisions.

Unit – A (Introduction to basic Accounting) 12 Hours

- Meaning and Objectives of Accounting, Accounting Terminology, Advantages and Disadvantages of Accounting
- Relationship between Accountancy and Accounting and Book Keeping
- Users of Accounting Information
- Relationship of Accounting with other Disciplines
- Generally Accepted Accounting Principles (Assumptions and Principles)
- Accounting Standards
- Double Entry System of Book- keeping
- Accrual and Cash basis of accounting
- Accounting Equation- Meaning and Procedure of Developing Accounting Equation

Unit – B (Journal, Ledger, Trial Balance and Final accounts) 12 Hours

- Journalizing- Meaning and Rules of Debit and Credit, Format of Journal, Identification of Transactions, Recording of transactions in Journal
- Distinction between Journal and Ledger, Preparation of Ledgers from Journal, Posting, Balancing of Accounts
- Meaning, Objectives and Advantages of Trial balance, Meaning and Methods of Preparation of Trial Balance
- Financial Statements- Meaning and Usefulness of Financial Statements, Recognition of Assets, Liabilities, Income and Expenses
- Preparation of Trading Account, Profit and Loss Account and Balance Sheet

Unit – C (Business finance, Sources of finance, Cost of capital, Investment decisions) 11 hours

- Business Finance: Conceptual foundations, finance function in business, scope and objectives, Relation of finance with other business functions**.**
- Source of finance: Equity and preference shares. Debentures convertible debentures – Relative merits and limitations
- Cost of capital: Cost of debt, Cost of preference share capital, cost of equity, Aggregate weighted average cost of capital.
- Capital Structure: Optimum Capital Structure, Determinants – Financial

leverage – concept, measurement and significance.

Unit – D **10 hours**

- Investment decisions – importance, difficulties, determining cash flows, methods of capital budgeting
- Working Capital Management: Cash securities, receivables and inventory management – management of working capital – kinds of working capital - Determinants of Working Capital.
- Dividend policy and decisions: Influencing factors – forms of dividend.– theories of dividend, Walter, Gordon and MM models, dividend and uncertainty, relevance of dividend, dividend policy in practice, forms of dividends, stability in dividend, corporate dividend behavior .

Text Book:

1. Tulsian, P. C. *Financial Accounting*. New Delhi: Pearson Education, 2013.
2. Srivastava, R. and Misra, *R. Financial Management*, Oxford University Press, 2013.

Reference Books::

1. Gupta, R.L and Radhaswamy, *M. Financial Accounting*. New Delhi: Sultan Chand and Sons.
2. Bhattacharyya, A. K. *Financial Accounting*. New Delhi: PHI Learning, 2nd Edition
3. Chandra, P. *Financial Management: Theory and Practice*. Tata McGraw HillEducation, 7th Edition.
4. Jain, K., Khan, Y. M., Jain, K. P. and Khan, Y. M. *Basic Financial Management*. Tata McGraw-Hill Education, 2nd Edition

Course Title: Office Automation Laboratory
Course Code: CSA104

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	Implementation of DOS commands
CO-2	Learning basics of MS Word
CO-3	Learning basics of MS Excel
CO-4	Learning basics of MS Power Point and MS Access

- Working of DOS internal & external commands.
- Learning to use MS WORD, MS EXCEL.
- Using MS PowerPoint to make slides and presentations.
- Introduction to the Database Window, Database Objects, Database Terminology
- Creating a Database using MS Access, Basic Tables
- Using Queries, Using the Auto Form Feature Form Design
- Using the Auto Report Feature, Report Design
- Copying Data, Freezing Columns
- Printing Tables, Printing Reports
- Sorting Records, Using the Filter Sorts, Renaming Columns

L	T	P	Credits	Marks
0	0	4	2	50

Course Title: Workshop on Desktop Publishing
Course Code: CSA113

Course Outcomes:

CO-1	Improving proficiency for working with Images
CO-2	To learn how to manipulating Text and objects.
CO-3	To enable students working with tables.

- Working with Images: Zooming & Panning an Image, Working with Multiple Images, Rulers, Guides & Grids, The New Auto-Blend & Auto-Align Layers Commands
- Resizing & Cropping Images, Working With Basic Selections tools, Getting Started With Layers, Brush Tool, Colors & Swatches, Using the Pencil & Eraser Tools
- Photo retouching: Red Eye Tool, Clone Stamp Tool, Patch Tool & the Healing Brush Tool, Spot Healing Brush Tool, Color Replacement Tool, Toning & Focus Tools
- Creating Graphical Objects: Set Up a Drawing Page, Draw shapes, Draw lines, add text to objects, Formatting Objects: Work with Fills, Modify Objects, Modify Outlines, Align Objects
- Manipulating Text: Fit Text on a Path, Work with Paragraph Text, Wrap Paragraph Text, Work with a Text Style, Modify OCR Text, Insert Special Characters, Spell Check a Document
- Working with Tables: Create a Table, Modify a Table, Format a Table, Enhancing a Drawing: Apply Artistic Effects to Objects, Create Symbols Working with Advanced Printing Options

Reference Books:

1. Brie Gyncild, *Adobe Photoshop CS6 in Classroom*, Delhi: Wiley Publications.
2. *Adobe Photoshop classroom in a Book*, Delhi: Adobe Press,2012.
3. Bain Steve, *Corel Draw 12. The official Guide* , New Delhi: Tata McGraw Hill, 2010
4. Miller Deborah, *CorelDRAW Bible*. New Delhi: Wiley,1999

Course Title: Principles of Programming and Algorithms using C
Course Code: CSA105
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The objective of this course is to help the students in finding solutions to various real life problems and converting the solutions into computer program using C language (structured programming). Students will learn to write algorithm for solutions to various real-life problems for converting the algorithms into computer programs using C language.

Course Outcomes:

CO-1	The objective of this course is to provide the knowledge about the various electronics components and digital circuits to the students and designing of various building blocks of computer system concepts.
CO-2	To introduce the basic concepts and laws involved in the Boolean algebra and logic families and digital circuits.
CO-3	To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.
CO-4	The course will help in design and analysis of the digital circuit and system. After studying this subject students will be able to easily understand the internal working of digital electronic circuits.

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UNIT-A **15 Hours**

Logic Development and Program Development Tools

- Data Representation, Flowcharts, Problem Analysis
- Decision Trees/Tables, Pseudo Code and Algorithms,
- Program Debugging, Compilation and Execution.

Fundamentals

- Character Set, Identifiers and Key Words, Data Types
- Constants, Variables, Expressions, Statements, Symbolic Constants.

Operations and Expressions

- Arithmetic Operators, Unary Operators, Relational Operators,
- Logical Operators, Assignment and Conditional Operators, Library functions.

UNIT-B **12 Hours**

Data Input and Output

- Single Character Input, Single Character Output, Entering Input Data
- More About Scan Functions, Writing Output Data, More About Print Functions
- Gets and Puts Functions, Interactive Programming.

Control Structures

- Introduction, Decision Making with If – Statement, If Else and Nested If,
- While And Do-While, For Loop.
- Jump Statements: Break, Continue, Goto, Switch Statement.

Functions

- Introduction To Functions, Function Declaration, Function Categories
- Standard Functions, Parameters And Parameter Passing, Pass – By Value/Reference
- Recursion, Global and Local Variables, Storage Classes.

UNIT-C **10 Hours**

Arrays

- Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices, Strings, String Handling Functions.

Structure and Union

- Declaration of Structure, Accessing Structure Members, Structure Initialization, Arrays of Structure, Nested Structures, Unions.

UNIT-D **8 Hours**

Pointers

- Introduction To Pointers, Address Operator And Pointers, Declaring and Initializing Pointers,
- Assignment through Pointers, Pointers and Arrays.

Files

- Introduction, Creating a Data File, Opening and Closing a Data File, Processing a Data File.

Preprocessor Directives

- Introduction and Use, Macros, Conditional Preprocessors, Header Files

Reference Books:

1. Kanetkar Yashvant P, *Let us C*, New Delhi :BPB Publications, Seventh Edition (2007).
2. Balagurusami E, *Programming in ANSI C*, New Delhi: Tata McGraw Hill, Fourth Edition (2010).
3. Gottfried Byron S., *Programming in C*, New Delhi: McGraw Hills, Second Edition 1996.
4. Kernighan & Richie,*The C Programming Language*, New Delhi: PHI Publication, Second Edition(2009) .
5. Gottfriet Bryon, *Schaum Outline Series, Programming in C*, New Delhi: McGraw Hills, 2010.

Course Title: Web Designing
Course Code: CSA106
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course will enable the student to build and publish web sites using Dreamweaver, a popular visual web site production and management program, using HTML, DHTML, CSS and PHP. This course will enable the student to build and publish web sites using Dreamweaver, a popular visual web site production and management program.

Course Outcomes:

CO1	Introduce the creation of static webpages using HTML
CO2	Using PHP for back-end manipulations, arrays and functions
CO3	Working with PHP forms and manipulating files
CO4	Publishing web sites

UNIT-A **15 Hours**

Introduction to Web Development

- Website, Webpage, Static Website, Dynamic Website.

Introduction to HTML/DHTML:

- HTML Basics, HTML Elements (Tags), Structure of HTML Program, Attributes, Headings, Paragraphs
- Formatting, Links, Images, Tables, Lists, Forms, Frames, Where to put Tables, Lists, Images, Forms
- CSS in DHTML, Implementation of Web Pages using CSS

UNIT-B **12 Hours**

Introduction to PHP

- PHP Environment, Syntax Overview, Variable Types,
- Constants, Operator Types, Decision Making, Control Statements
- Arrays, Strings, Web Concepts, GET & POST
- File Inclusion, Functions and Objects

UNIT-C **10 Hours**

Working with Forms,

- Web Concepts, GET & POST, Maintaining Cookies and Sessions
- Working with Files, Opening, closing, coping, renaming and deleting a
- file, File uploading and downloading, Generating and creating Images with PHP
- Database Connectivity with MySQL, performing basic operations (insert, delete, update, select).

UNIT-D **8 Hours**

Purchasing a Domain Name & Web Space

- Domain Name & Web Space, Getting a Domain Name & Web Space (Purchase or Free), Uploading the Website to Remote Server

Reference Books:

1. Powell Thomas, *HTML & CSS: The Complete Reference*, New Delhi: McGraw-Hill, Fifth Edition (2010).
2. Andy Harris, *HTML, XHTML* and *CSS All in One For Dummies*, Delhi: Willey ,Second Edition (2010).
3. Lerdorf Rasmus, Tatroe Kevin, MacIntyre Peter, *Programming PHP*, Delhi: O'Reilly Media**,** 2013.
4. Dietel and Dietel, *Internet and World Wide web: How to Program*, Pearson(2008)
5. Ullman Larry, *PHP for the World Wide Web,Visual QuickStart Guide*. New Delhi: Peachpit Press, fourth edition (2011)
6. Uttam K. Roy, *Web Technologies* , Oxford HigherEducation.
7. Chris Bates, *Web Programming Building Internet Applications*, 2 ed, John Wiley & Sons, 2002

Course Title: Mathematical Foundation of Computer Science
Course Code: MTH190
Course Duration: 45 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The syllabus of this course is specially designed for the beginners in computer science with the first exposure to mathematical topics essential to their study of computer science or digital logic. Topics like algorithm complexity will help them in learning the important concepts of C language and algorithm design and analysis.

Course Outcomes:

CO-1	To understand the Matrix Algebra.
CO-2	Students will learn Differentiation and Integration
CO-3	To the basic of Statistics and Applications of Logarithms
CO-4	To learn the concept of Algorithms and its Complexity

UNIT-A **15 Hours**

Matrix Algebra

- Matrix Algebra Matrices, Types of Matrices, Operations on Matrices, and Properties Of Determinants (Statement Only)
- Minors, Cofactors, Adjoint and Inverse of a Matrix, Elementary Transformations in a Matrix Rank of a Matrix,
- Solution of Simultaneous Equations using Crammer'S Rule and Matrix Inversion Method. Characteristics of Polynomial
- Eigen Values, Nature of Eigen values, Certain Types of Matrices, Cayley – Hamilton Theorem.

UNIT-B **12 Hours**

Differentiation and Integration

- Laws of Derivative, Chain Rule
- Differentiation Using Log, Repeated Derivatives, Derivatives of Implicit Functions Integration of Algebraic, Logarithmic and Exponential Function, Integration of Functions Using Partial Fraction (Simple Form Using Properties)
- Integration of Functions by Parts, Definite Integral

UNIT-C **10 Hours**

Statistics

- Introduction to Statistics, Measures of Central Tendency Mean, Median and Modes
- Measures of Dispersion, Mean Deviation, Standard Deviation and Coefficient of Variation.

Applications of Logarithms

- Problems Related To Compound Interest, Depreciation and Annuities.

UNIT-D **8 Hours**

Algorithms and Complexity

- Algorithms, Searching Algorithms, Sorting

- Growth of Functions, Big O Notation, Big Omega and Big Theta Notation
- Complexity of Algorithms, Mathematical Induction, The Basic of Counting, The Pigehole Principle

Reference Books:

1. Bali N.P, *Text Book of Engineering Mathematics,* Lakshmi Publications, fifth edition (2012)
2. Grimaldi Ralph P, *Discrete and Combinational Mathematics*, Delhi :Pearson Education, Forth Edition (2011)
3. Rajaraman, *Computer Oriented Numerical Methods*, New Delhi :PHI Publications, Third Edition (2010).
4. Sancheti D.C., *Business Mathematics*, New Delhi: Sultan Chand & Sons, Eleventh Edition (2012)
5. Tremblay J. P & Manohar R. P, *Discrete Mathematical Structures with Applications to Computer Science*,Delhi: MGH Publications, Ninth Edition(2010).

Course Title: Environmental Studies
Course Code: EVS100
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course aims at understanding the students in aspects of environmental problems, its potential impacts on global ecosystem and its inhabitants, solutions for these problems as well as environmental ethics which they should adopt to attain sustainable development.

Course Outcomes:

CO-1	Understand the interconnected and interdisciplinary nature of environmental studies and develop critical thinking skills in relation to environmental affairs. Acquire knowledge about the depletion of the root cause of natural resources and their effective management.
CO-2	To aware about the biodiversity and its importance to mankind. Interpret and propose solutions to various environmental pollution, solid waste and disaster management.
CO-3	Expand awareness of self in a global society and effectively engage diverse perspectives, values, and cultures, ranging from local to global, in dealing with environmental and social issues.
CO-4	Awareness about effect of population increase on humans itself. Causes of spread of different diseases in society. How Indian government is supporting women and children that considered weakest section of society

Unit 1

The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Natural Resources: Renewable and non-renewable resources:

Natural resources and associated problems.

(a) **Forest resources:** Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) **Water resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) **Food resources:** World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) **Energy resources:** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

(f) **Land resources:** Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Ecosystem:

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Unit II

Biodiversity and its conservation

- Introduction – Definition: Genetic, Species and Ecosystem Diversity
- Bio-geographical classification of India
- Value of biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity, global and national efforts.

Environmental Pollution

- Definition, causes, effects and control measures of:

  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution

g. Nuclear pollution

- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

Unit III

Social Issues and the Environment

Population growth, variation among nations, Population explosion – Family Welfare Programmes.

- Environment and human health,
- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Laws: The Environment Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and control of Pollution) Act 1974; The Wildlife Protection Act, 1972; Forest Conservation Act, 1980.
- Issues involved in enforcement of environmental legislation
- Public Awareness

Unit IV

Human Population and Environment

Population Growth and Variations among Nations

- Population Explosion
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

Field Work

- Visit to a local area to document environmental assets river/ forest/ grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-Pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Suggested Readings:

1. Odum, EP. *Basic Ecology*. Japan: Halt Saundurs, 1983.
2. Botkin, DB, and Kodler EA. *Environmental Studies: The Earth as a living planet.* New York: John Wiley and Sons Inc., 2000.
3. Singh, JS, Singh, SP, and Gupta SR. Ecology, *Environment and Resource Conservation.* New Delhi: Anamaya Publishers, 2006.
4. De, AK. *Environmental Chemistry*. New Delhi: Wiley Eastern Ltd., 1990.
5. Sharma, PD. *Ecology and Environment*. Meerut Rastogi Publications, 2004.

Course Title: Human Values and Ethics
Course Code: SGS107
Course Duration: 35 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Outcomes:

CO-1	To sensitize students about the role and importance of human values and ethics in personal, social and professional life.
CO-2	To encourage students to read and realize the values of enlightened human beings.
CO-3	To enable students to understand and appreciate ethical concerns relevant to modern lives.

UNIT-A

Human Values

Concept of Human Values: Meaning, Types and Importance of Values
Human Values : Lessons from the lives and teachings of
Value Education : The content of value education
Value crisis and its redressal

UNIT-B

Being Good and Responsible

- Self-Exploration and Self Evaluation
- Acquiring Core Values for Self Development
- Living in Harmony with Self, Family, Society and Nature
- Values enshrined in the Constitution : Liberty, Equality Fraternity and Fundamental Duties

UNIT-C

Value – based living

- Vedic values of life
- Karma Yoga and Jnana Yoga
- Ashta Marga and Tri-Ratna
- Truth, Contentment and Wisdom

UNIT-D

Ethical Living:
Ethics: Difference between Ethics and Values

- Personal Ethics
- Professional Ethics
- Ethics in Governance
- Ethics in Education

Suggested Readings:

1. Restoring Values (ed.) E. Sreedharan and Bharat Wakhlu, Sage Publications Ltd., New Delhi 2010.
2. Indian Ethos and Values by Nagarajan K, Tata McGraw Hill, 2011
3. Human Values, A N Tripathi, New Age International Publishers, New Delhi, Third Edition, 2009
4. Indian Ethos and Values in Management, 1st Edition by Sankar, Tata McGraw Hill Education Pvt. Ltd.
5. Values and Ethics, Osula, Asian Books, 2001.
6. Professional Ethics, R. Surbiramanian, Oxford University Press, New Delhi, 2013.
7. Human Values and Professional Ethics, Rishabh Anand, Satya Prakashan, New Delhi, 2012
8. Human Values and Professional Ethics, Sanjeev Bhalla, Satya Prakashan, New Delhi, 2012.
9. Human Values and Professional Ethics, Ritu Soryan Dhanpat Rai & Co. Pvt. Ltd., First Edition, 2010.
10. Human Values and Professional Ethics by Suresh Jayshree, Raghavan B S, S Chand & Co. Ltd. , 2007.
11. Human Values and Professional Ethics, Dr. R K Shukla, Anuranjan Misra, A B Publication 2010.
12. Human Values and Professional Ethics, Sharma, Vayu Education of India Language publishers, 2012.
13. Human Values and Professional Ethics, S. Kannan, K. Srilakshmi, Taxmann Publication, Pvt. Ltd., 2009
14. Human Values and Professional Ethics, Smriti Srivastava, S K Kataria & Sons, 2001
15. Human Values and Professional Ethics, Yogendra Singh, Ankur Garg, Aitbs publishers, 2011.
16. Human Values and Professional Ethics, Vrinder Kumar, Kalyani Publishers, Ludhiana, 2013.
17. Human Values and Professional Ethics, R R Gaur, R. Sangal, GP Bagaria, Excel Books, New Delhi 2010.
18. Values and Ethics, Dr. Bramwell Osula, Dr. Saroj Upadhyay, Asian Books Pvt. Ltd., 2011.
19. Complete works of Swami Vivekanand, Advaita Ashram, Calcutta – 1931.
20. Indian Philosophy, S. Radhakrishnan, George Allen & Unwin Ltd., New York: Humanities Press INC, 1929.
21. Essentials of Hinduism, Jainism and Buddhism, A N Dwivedi, Books Today, New Delhi – 1979
22. Light of Truth : Satyarth Parkash, Maharishi Dayanand Saraswati, Arya Swadhyay Kendra, New Delhi, 1975.
23. Dayanand : His life and work, Suraj Bhan, DAVCMC, New Delhi – 2001.
24. Moral and Political Thoughts of Mahatma Gandhi, V. Raghavan, N Iyer, Oxford University Press India, New Delhi, 2000.
25. Guru Nanak Dev's view of life, Amplified by Narain Singh, Published by Bhagat Puran Singh All India Pingalwara Society, Amritsar 2010.
26. Esence of Vedas, Kapil Dev Dwivedi, Katyayan Vedic Sahitya Prakashan, Hoshiarpur, 1990.
27. Vedic Concepts, Prof. B B Chaubey, Katyayan Vedic Sahitya Prakashan, Hoshiarpur, 1990.

28. Mahatma Gandhi : Essays and Reflections on his life and work by Saravapalli Radhakrishnan, Zaico Publication, Mumbai, 1977.
29. Lala Har Dayal, Hints for Self Culture, Jaico Publishing House, Mumbai, 1961.
30. Maharishi Swami Dayanand Saraswati, The Light of Truth (The Satyartha Prakashan), available at URL :
www. aryasamajjamnagar.org/download/satyarth_prakash_eng.pdf
31. Krishnamurti J, The First and Last Freedom, available at URL :
http://www.jiddu-krishanmurti.net/en/th-first-and-last-freedom/
32. Sri Raman Maharishi, Who Am I, available at URL :
http://www.sriramanamaharshi.org/resource_centre/publicatins/who-am-i-books/
33. Ramesh S Balsekar, Peace and Harmony in Daily Living, Yogi Impressions; 1st edition

- Spectrum's Handbook of General Studies – 2013-14, Spectrum Books (P) Ltd., New Delhi
- Unique Quintessence of General Studies – 2013-14, Unique Publishers, New Delhi.

Current Affairs

Magazines

Economic and Political Weekly, Yojna, the Week, India Today, Frontline, Spectrum.
Competition Success Review, Competition Master, Civil Services Chronicle, Current Affairs, World Atlas Book

Newspapers

The Hindu, Times of India, The Hindustan Times, The Tribune

Course Title: C Programming Laboratory
Course Code: CSA108

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	To enhance skill on problem solving by constructing algorithms.
CO-2	To Identify solution to a problem and apply control structures and user defined functions for solving the problem.

Implementation of C programming concepts:

- Control Structures, Loops, Arrays, Strings
- Functions, Structures, Union, Files, etc.

Course Title: Web Designing Laboratory

Course Code: CSA109

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	Creating static web pages using HTML
CO-2	Using PHP for Creation of web pages

- Web designing using HTML, DHTML, CSS, and PHP.

Course Title: Computer Oriented Numerical and Statistical Techniques
Course Code: CSA201
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The course aims at discussing various significant and fundamental concepts to inculcate in the students an adequate understanding of the application of Numerical Algorithms and Statistical Methods.

Course Outcomes:

CO-1	To discussing various significant and fundamental concepts to inculcate in the students an adequate understanding of the application of Numerical Algorithms and Statistical Methods.
CO-2	To understanding and Learning of numerical methods for numerical analysis.
CO-3	To understanding the implementation of numerical methods using a computer.
CO-4	To learning of tracing errors in Numerical methods and analyze and predict it.

UNIT – A **12Hours**

Errors and Sources of Propagation for Errors

- Floating Point Representation of Numbers
- Arithmetic Operations with Normalized Floating Point Numbers and Their Consequences
- Error in Number Representation Pitfalls in Computing

Iterative Methods

- Zeros of aSingle Transcendental Equation and Zeros of Polynomial Using Bisection Method
- False Position Method
- Newton Raphson Method
- Convergence of Solution

12 Hours

UNIT – B

Solution of Simultaneous Linear Equation

- Gauss Elimination Method
- Pivoting
- ILL Conditioned Equations And Refinement Of Solutions
- Gauss Siedel Iterative Methods

Numeric Differentiation and Integration

- Numerical Differentiation Using Interpolation Method
- Numerical Integration, Trapezoidal Rule
- Simpson's 1/8 Rule, Simpson 3/8 Rule.

UNIT – C **12 Hours**

Numerical Solution of Ordinary Differential equations

- Euler Method
- RungaKuttaMethod
- Predictor Corrector Method.

Introduction to Statistics

- Meaning, Scope, Collection and Classification of Data.

- Methods to Measures Central Tendency

UNIT-D **12 Hours**

Dispersion

- Meaning
- Measurement of Dispersion (Mean Deviation, Standard Deviation and Variance)

Bivariate Data

- Correlation, Meaning, Type of Correlation, Correlation and Causation, Methods of Studying Correlation,
- Algorithm to Compute Karl Pearson's Correlation and Rank Correlation. Applications Based On Correlation.

Reference Books:

1. Rajaraman V, *Computer Oriented Numerical Methods*, Prentice Hall, India, 1993
2. Gupta S.C, *Fundamental of Statistics*,Himalayas Publication House,2007
3. Gupta &Kapoor,*AppliedStatistics*,Sultan Chand & Sons, 2007
4. Gupta S.P, *Statistical Method*, Sultan Chand & Sons, 2009

Course Title: Object Oriented Programming Structures
Course Code: CSA202
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course will expose you to the features of object oriented programming concepts such as inheritance, encapsulation, polymorphism, exception and file handling, which help you design software.

Course Outcomes:

CO-1	Describe the object-oriented programming approach in connection with C++.
CO-2	Introduce console I/O and operator overloading.
CO-3	Explain Friend Function, Type Conversion and Inheritance.
CO-4	Understand Virtual Functions and file handling.

UNIT – A **12 Hours**

Introduction

- Evolution Of OOP, OOP Features Of C++
- Characteristics of Object Oriented Language – Objects, Classes, Inheritance, Reusability, User Defined Data Types, Polymorphism, Overloading
- Comparison of C with C++.

Class Concepts

- Class and Objects,Inline Functions, Static Data Members and Member Functions
- Constructors and Destructors
- Dynamic Objects, Array of Pointers to Object, Pass By Value Vs. Pass By Reference
- Localand Global Class, Nested and Empty Class, Preprocessor Directives, Namespace.

UNIT– B **11 Hours**

Console I/O

- Hierarchy of Console Stream Classes
- Unformatted and Formatted I/O Operations, Manipulators

Operator Overloading

- Overloadable Operators, Overloading Unary and Binary Arithmetic and Relational Operators
- Overloading Subscript, Array, Insertion, Extraction, New and Delete Operators.

UNIT– C **11 Hours**

Friend Function and Type Conversion

- Friend Function, Function Overloading, Overloading Operators through Friend Function
- Basic Type Conversion, Conversion Between Objects and Basic Types
- Conversion Between Objects of Different Classes

Inheritance

- Derivation Rules, Different Forms of Inheritance

- Roles of Constructors and Destructors in Inheritance.

UNIT– D **11 Hours**

Virtual Functions

- Virtual Functions and Their Needs, Pure Virtual Function
- Virtual Destructor, Virtual Derivation, Abstract Class.

File Handling

- Hierarchy of File Stream Classes, Opening and Closing Files
- File Modes, Testing for Errors
- File Pointers and Their Manipulations, ASCII &Binary Files
- Sequential and Random Access Files

Reference Books::

1. Stroustrup Bjarne, *The C++ Programming Language*, New Delhi: Addison-Wesley Professional,2000
2. Lafore Robert, *Object Oriented Programming in C++*. Delhi: Sams Publishing,2000
3. Balaguruswami E, *Object Oriented Programming In C++*, New Delhi: Tata McGrawHill ,2006
4. Lippman, Tom Weiss, *C++ Primer*, New Delhi: AddisonWesley,2005
5. Scildt Herbert ,*C++The Complete Reference*, New Delhi: Tata McGrawHill,2007

Course Title: Database Concepts
Course Code: CSA203
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objectives: This course covers fundamentals of database architecture, database management systems, and database systems, Principles and methodologies of database design, and techniques for database application development.

Course Outcomes:

CO-1	Effectively explains the basic concepts of databases, features of database management systems.
CO-2	Understand architecture of database systems and the role of database users.
CO-3	Introduce data models, keys used in relational system and SQL.
CO-4	Discuss database protection mechanisms and normalization.
CO-5	Introduce SQL and different DDL, DML, DCL statements to create, manipulate database and control access to data stored in database.

UNIT – A **10 Hours**

An Overview of DBMS

- Concept of File Processing Systems and Database Systems
- Database Administrator and his Responsibilities
- Physical and Logical Data Independence

Three level Architecture of Database System

- The External Level, Conceptual Level, The Internal Level

UNIT-B **12 Hours**

Introduction to Data Models

- Entity Relationship Model, Hierarchical
- Network and Relational Model
- Comparison of Network, Hierarchical and Relational Model
- E–R Diagram
- Different Keys Used In a Relational System, Sql
- Introduction to Big Data and NoSQL

UNIT – C **10 Hours**

Database Protection

- Recovery, Concurrency Management
- Database Security, Integrity and Control
- Disaster Management

Normal Forms: INF, 2NF, 3NF, BCNF, 4th NF, 5th NF, and DBTG

13 Hours

UNIT – D

SQL *PLUS

- Introduction to SQL–DDL, DML, DCL, Join Methods & Sub Query
- Union Intersection, Minus, Tree Walking, Built in Functions
- Views, Security Amongst Users, Sequences, Indexing

PL/SQL

- Introduction to PLS/SQL (Data Types, Variable, Conditional and Looping Statements)

Reference Books::

1. Desai Bipin C, *An Introduction to Database System*, New Delhi: Galgotia Publications, 2010
2. Date C.J, *An Introduction to Data Base Systems*, New Delhi: Narosa Publications, Eighth Edition,2012
3. Korth Henry F, *Database System Concepts*, New Delhi: McGraw Hill, 2010
4. Ullman, *Principles of Database Systems*, New Delhi: Galgotia Publications ,2010.
5. Coronel, Moris, Rob, *Database Systems: Design, Implementation, and Management*, New Delhi South-Western, Ninth Edition (2009)

L	T	P	Credits	Marks
4	0	0	4	100

Course Title: Computer System Architecture
Course Code: CSA204
Course Duration: 45-60 Hours

Course Objective: The objective of the course is to provide students with a solid foundation in computer design. Examine the operation of the major building blocks of a computer system Syllabus includes instruction set architecture, control design, memory hierarchy, input/output and communication.

Course Outcomes:

CO-1	Demonstrate the working of central processing unit and RISC and CISC Architecture.
CO-2	Describe the operations and language for the register transfer, micro operations and input- output organization.
CO-3	Understand the organization of memory and memory management hardware.
CO-4	Elaborate advanced concepts of computer architecture, Parallel Processing, inter-processor communication and synchronization.

UNIT – A **15 Hours**

Introduction to Computer Organization

- Introduction to Computer and CPU
- (Computer Organization, Computer Design and Computer Architecture), Stored Program Concept- Von Neumann Architecture.

Register Transfer and Micro operations

- Introduction to Registers, Register Transfer Language
- Data movement among Registers and Memory

Micro operations

- Introduction to micro operations, Types of micro operations—Logic Operations, Shift operations, Arithmetic and Shift operations

Common Bus System

- Introduction to Common Bus System, Types of Buses(Data Bus, Control Bus, Address Bus),
- 16 bit Common Bus System--Data Movement among registers using Bus

UNIT– B **11 Hours**

Basic Computer Instructions

- Introduction To Instruction, Types Of Instructions (Memory Reference, I/O Reference And Register Reference), Instruction Cycle,
- Instruction Formats (Direct and Indirect Address Instructions, Zero Address, One Address, Two Address and Three Address Instructions)
- Interrupt
    - Introduction to Interrupt and Interrupt Cycle

Design of Control UNIT:

- Introduction to Control UNIT, Types of Control UNIT

(Hardwired & Micro programmed Control UNIT).

Addressing Modes

- Introduction & different types of Addressing Modes

UNIT– C **12 Hours**

Computer Organization

- Microcomputer Organization; Microprocessor Organization, Instruction codes
- Memory Reference, Register Reference and Input-Output Reference Instructions
- Instruction cycle, Instruction formats
- Processing UNIT Design: one, two and three bus Organization.
- Addressing Mode, CISC, RISC

Memory Organization

- Memory Hierarchy, Types of Memory: RAM and ROM Chips,
- Associative Memory, Cache Memory, Auxiliary Memory, Virtual Memory
- Memory Address Map, Memory Connection to CPU.

UNIT– D **7 Hours**

Input Output Organization

- Input output Interface, Memory Mapped I/O; Interrupt
- Asynchronous Data Transfer: Strobe Control, Handshaking
- Priority Interrupts: Daisy-Chaining, Parallel Interrupt, Priority Encoder
- Interrupt Cycle, Types of Interrupt: Program interrupt
- Priority Interrupts, Direct Memory Access (DMA).
- Introduction to Assembly Language.

Reference Books:

1. Mano M.M.,*Computer System Architecture*, Delhi: Prentice Hall of India, 1993
2. Mano M.M., *Digital Logic and Computer Design*, Delhi: Prentice Hall of India 1993.
3. Hayes,*Computer Architecture and Organization*,New Delhi : McGrawHill International Edition,2010.
4. Tannenbaum A.S., *Structured Computer Organization*, Delhi: Prentice Hall of India, 2010
5. Brey B, *The Intel Microprocessors*, New Delhi: Pearson Education, 2008.
6. Sloan M.E, *Computer Hardware and Organization*, 2nd Edition,New Delhi: Galgotia, Pvt. Ltd, 2010

Course Title: Information Systems
Course Code: CSA211
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To provide knowledge about the concepts and usage of different types of information systems at various managerial levels in the organizations.

Course Outcomes:

CO-1	To inculcate students with comprehensive knowledge of information system and information technology for the use in business.
CO-2	To provide knowledge on systems design, development and implementation.
CO-3	To enable students understand the role of information system in managerial decision making
CO-4	To apply specific knowledge of information system in functional areas of business

UNIT-A **15 Hours**

Introduction

- Fundamental Aspects of Information, Capturing of Information, Converting Information to Computer – Readable Form, Sources of Information.
- Basic Systems Concepts, Elements or Components of System, Characteristics of System, Types of Systems, System Approach.
- Information Systems: Definition &Characteristics, Types of Information, Role Of Information in Decision - Making, Levels of Management
- Introduction to Different Kinds of Information Systems.

UNIT-B **12 Hours**

Information Systems

- Categories of Information Systems, Development Life Cycle of Information System
- Technologies For Information System: Latest Trends In Hardware and Software

An overview of Management Information System

- Definition &Characteristics, Components of MIS, Frame Work for Understanding MIS: Robert Anthony's Hierarchy Of Management Activity
- Structured Vs Unstructured Decisions, Formal Vs. Informal Systems, Pitfalls In MIS Development

UNIT-C **8 Hours**

Introduction to Decision Support System

- Simon's Model of Decision, DSS: Concept, Characteristics And Components, Gorry and Scott Morton Grid, Introduction to GDSS

Various types of information systems

- Transaction Processing Systems, Office Automation Systems, Executive Support Systems.

UNIT-D **10 Hours**

Developing Information Systems

- Analysis and Design of Information Systems
- Implementation and Evaluation of Information Systems.

Functional MIS

- A Study of Marketing, Personnel, Financial and Production MIS

Case studies of the Information System

- Accounting Information Systems, Inventory Control Systems and Marketing Systems.

Reference Books:

1. Laudon K.C.,*Management Information Systems*, New Delhi:Pearson 11th Ed.
2. Murdick, Robert G., & Ross, Joel E., & Claggett, James R, *Information Systems for Modern Management*, PHI ,Third Edition.
3. Kanter, J, *Management Information Systems*, PHI, 3rd Ed
4. Goyal, D.P, *Management Information Systems*, Macmillan, 3rd Ed.
5. Oz, Effy, *Management Information Systems*, Thomson Press Indian Edition

Course Title: Database Concepts Laboratory
Course Code: CSA207

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	Students get practical knowledge on designing and creating relational database systems.
CO-2	Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
CO-3	Use of various software to design and build ER Diagrams.
CO-4	Explain UML, Flow chart for related database systems.
CO-5	Aware of developing programs using PL/SQL.

Implementation of SQL

- Implementation of various DDL, DML, DCL, TCL statements.
- Practice of PL/SQL.

Course Title: Object Oriented Programming Structures Laboratory
Course Code: CSA208

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	Develop solutions for a range of problems using objects and classes.
CO-2	Programs to demonstrate the implementation of constructors, destructors and operator overloading.
CO-3	Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism.
CO-4	Able to use various object oriented concepts to solve different problems.

- Implementation of OOP concepts using C++
- Write program in 'C++' language
- Using input and output statements
- Using control statements.
- Using functions.
- Using array
- Using Classes and implementation of Constructor and Destructor.
- Using files.
- Using OOP's Concepts (Inheritance, Polymorphism, Encapsulation, Friend and Static Functions, Exception Handling)

Learning Outcomes:

- Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.
- Able to make use of objects and classes for developing programs.
- Able to use various object oriented concepts to solve different problems.

Course Title: Workshop on E-Marketing
Course Code: CSA221

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	Analyse the confluence of marketing, operations, and human resources in real-time delivery.
CO-2	Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities.
CO-3	Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks.
CO-4	Interpret the traditional marketing mix within the context of a changing and extended range of digital strategies and tactics.

- Introduction to digital marketing
- Digital Strategy and Planning
- Website marketing tools
- Digital content – website, blogs, email, webinars, videos, podcasts, e-zines, PPC advertising
- Social Media and Social Bookmarking – Facebook, Twitter, Pinterest, Instagram, YouTube and YouTube channels and emerging social medias
- Search Engine Marketing – What it is, how it works and how to make it work
- Search Engine Optimisation -What it is, how it works and how to make it work
- Measuring Digital media performance • Ecommerce, Tcommerce and Mcommerce
- Implementing the digital marketing plan • Website design /development for digital marketing
- Mastering Google - AdWords Advertising, Analytics & Applications

Reference Books:

1. Blanchard O. (2014) Social Media ROI: Managing and Measuring Social Media Efforts in Your Organization
2. Pulizzi, J. (2013) Epic Content Marketing Marketing on Facebook – Best practice guide (2015) Facebook Marketing Press
3. Chaffey, D., & Ellis-Chadwick, F. (2012) Digital Marketing: Strategy, Implementation and Practice, 5/E, Pearson
4. Tapp, A., & Whitten, I., & Housden, M. (2014) Principles of Direct, Database and Digital Marketing, 5/E, Pearson
5. Tasner, M. (2015) Marketing in the Moment: The Digital Marketing Guide to Generating More Sales and Reaching Your Customers First, 2/E, Pearson

Websites

www.smartinsights.com
www.hubspot.com
www.mashable.com
www.emarketer.com
www.socialmediaexaminer.com
www.brandrepublic.com

www.allfacebook.com
www.insidefacebook.com
www.ipassexam.com
www.wordstream.com
www.seomoz.org/
www.searchengineland.com
www.searchenginewatch.com

Course Title: Data Structures
Course Code: CSA209
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The emphasis of this course is on the organization of information, the implementation of common data structures such as lists, stacks, queues, trees, and graphs.

Course Outcomes:

CO-1	Implement abstract data types using arrays and to analyze the various sorting and searching algorithms.
CO-2	Apply the different linear data structures like linked lists, stack and queues.
CO-3	Implement different types of trees and heaps and apply them to problem solutions
CO-4	Discuss graph and file structure and understand various operations on graphs and their applicability.

UNIT – A **10 Hours**

Preliminaries

- Introduction to Data Structures: Primitive and Composite, Various Data Structures
- Common Operations on Data Structures, Algorithm Complexity
- Big O Notation, Time, Space Tradeoff Between Algorithms
- Complexity of Algorithms, Records and Pointers.

Arrays

- Arrays Defined, Representing Arrays in Memory, Various Operations on Linear Arrays
- Multi Dimensional Arrays, Records, Matrices, Sparse Matrices
- Linear Search, Binary Search
- Insertion Sort, Selection Sort, Bubble Sort, Merge Sort
- String, Representation and Manipulation

UNIT– B **12 Hours**

Linked Lists

- Types of Linked Lists, Representing Linked Lists in Memory
- Advantage of Using Linked Lists Over Arrays
- Various Operation on Linked Lists

Stacks

- Description of Stack Structure, Implementation of Stack Using Arrays and Linked Lists
- QuickSort Technique to Sort an Array, Parenthesis Checker.

Queues

- Implementation of Queue Using Arrays and Linked Lists
- De-Queues, Priority Queues and Their Implementation, Aapplications of Queues.

UNIT– C **12 Hours**

Trees

- Description of Tree Structure and Its Terminology, Binary Search Tree

- Implementing Binary Search Tree Using Linked Lists
- Various Operations on Binary Search Trees

Heaps

- Description of Heap Structure, Implementing Heaps Using Arrays
- Various Operations on Heaps, Applications of Heaps
- Heap Sort Technique to Sort an Array

UNIT– D **11 Hours**

Graphs

- Representation of Graphs And Applications: Adjacency Matrix, Path Matrix
- Warshall's Algorithm, Linked Representation of A Graph
- Traversing aGraph, DFS and BFS.

Files

- Operations on Files, Types of Files
- File Organizations: Sequential Files, Indexed Sequential File, Directed Files and Multikey Files
- File Performance Criteria and Terms.

Reference Books::

1. Lipschutz Seymour, *Theory and Problems of Data Structures*, Schaum Outline Series, New Delhi: Tata McGrawHill Book Company, 2001.
2. Mark Allen Weiss, *Data Structures and Algorithm Analysis In C* , Mexico City:Addison Wesley, (An Imprint of Pearson Education),.New Delhi: Prentice Hall of India Pvt. Ltd, 1993.
3. Esakov Jeffery, Weiss Tom, *Data Structures: An Advanced Approach Using C*, New Delhi: Prentice Hall International, Inc, 2007.
4. Trembley and Sorenson,*An Introduction to Data Structures with Application*, New York :
   McGraw Hill Company, 1984.
5. Tanenbaum, *Data Structures using C*, New Delhi: Pearson Education, *2009*.

Course Title: Programming in C#
Course Code: CSA210
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course provides the knowledge about creating windows forms, namespaces, assemblies, handling exceptions, casting, memory management and pointers. They also learn the concepts of threads and database connectivity.

Course Outcomes:

CO-1	To attain knowledge of the structure and model of the programming language C #
CO-2	To use the programming language C # for various programming technologies.
CO-3	To develop knowledge of object-oriented paradigm in the C # programming language.
CO-4	To assemble forms, classes, and controls into C# solutions utilizing arrays and designing window forms (SDI & MDI)

UNIT-A
Introduction to .NET Environment **10 Hours**

- .Net Architecture, The Relationship of C# To .Net , The Common Language Runtime , Advantages of Managed Code, Use of Attributes, Deployment.
- The Common Language Runtime, Framework Base Classes, User and Programs Interface, Visual Studio .NET, .NET Languages, Benefits of The .NET Approach

UNIT-B

C# Fundamentals **13 Hours**

- C# Basics , Variables , Predefined Data Types : Value Types and Reference Types , CTS Types , Namespaces, Using Statement, The Main() Method , Multiple Main Methods , Passing Arguments To Main() . More on Compiling C# Files,
- C# Programming Guidelines, C# Pre-processor Directives
- Operator Shortcuts, The Ternary Operator, The Checked and unchecked Operators, The Is Operator , The as Operator , The Sizeof Operator , The Type of Operator , Nullable Types and Operators , The Null Coalescing Operator , Operator Precedence
- Type Safety, Type Conversions, Console I/O, Using Comments. Conditional Statements, Loops, Jump Statements Boxing and Unboxing
- Difference between C++ and C#, Difference between Java and C#.

UNIT-C **10 Hours**
Object oriented aspects of C#

- Classes, Objects, Partial Classes, Static Classes, Object Class Inheritance: Types of Inheritance, Method Overloading, Virtual Methods, Hiding Methods, Calling Base Versions of Functions.
- Sealed Classes and Methods, Constructors of Derived Classes ,

Modifiers, Interfaces , Derived Interfaces

- Operator Overloading, Delegates, Events, Errors and Exceptions

UNIT-D **12 Hours**

I/O and Object serialization

- I/O: System. I/O, Streams, TextWriter, TextReader

Writing windows forms applications and deploying windows forms applications

- Writing Windows Forms Applications: Understanding Windows Forms, Window Form Controls, Menus, MDI Forms
- Using Inheritance In Windows Forms, Using Common Dialog Controls,
- Deploying Windows Forms Applications

Reference Books:

1. Nagel Christian, Evgen Bill and GiynnJay, *Professional C# 2005*, Wrox Publications, 2006
2. Dietel & Dietel , *C# How to Program*, New Delhi: Pearson Education, 2007.
3. Sharp John & Jagger John,*Visual C#.Net*, New Delhi: PHI, New Delhi, 2005.
4. Francisco, *Visual Studio .Net*, Microsoft Publication, 2012.
5. Jones, Bradley L, *Teach Yourself C# in 21 Days*. Sams publishing, 2001
6. Balagurusamy, E., *Programming in C#*, New Delhi:Tata McGraw-Hill (UNIT I, II),2004.

Course Title: CSA213
Course Code: Software Engineering
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The course should provide an introduction to the fundamentals principles of software engineering. The present course should seek to equip the student with a repertoire of principles, tools and techniques and make him/her appreciate that software engineering is, after all, an exercise in making compromises.

Course Outcomes:

CO-1	Decompose the given project in various phases of a lifecycle. Choose appropriate process model depending on the user requirements.
CO-2	Perform various life cycle activities like analysis, design, implementation, testing and maintenance. Recognize various processes used in all the phases of the product.
CO-3	Apply the knowledge, techniques, and skills in the development of a software product.
CO-4	Explain project management techniques.

UNIT—A **8 Hours**

Software engineering Background:

- Introduction to Software Engineering, Software engineering principles
- How is software engineering an engineering discipline
- Information system characteristics, software development process models,
- Life Cycle Concepts, Software Phases and Deliverables, Software Development Strategies

UNIT—B **8 Hours**

Technical development:

- Structured systems analysis and design requirements
- Collection and Specification
- Design Objectives, Design Principles
- Data Flow and Logical Data Modeling, Cost Benefit Analysis
- Feasibility study, User Interface Designs, Physical Data Design
- Software Development Strategies: Top–down and Bottom–up, Structured Programming
- Testing: Level of testing, Test cases and test criteria, Functional Testing, Structural Testing

UNIT—C **14 Hours**

Software project management:

- Principles of software project management organizational and team structure
- Project Planning, Project Initiation and Project Termination; Technical
- Quality And Management Plans, Project Controls, Cost Estimation Methods-Function Points and COCOMO, Tools
- Software quality management: quality control, quality assurance, quality standards

UNIT—D **15 Hours**

Software Development Method & CASE:

- Software metrics, verification and validation
- Software configuration management.
- Formal, semi-formal and informal methods
- Data function, and event based modeling
- CASE Tools, CASE Standards
- Software documentation, Types of software Maintenance

Reference Books:

1. Pressman R. S., *Software Engineering: A practitioner's Approach*, New York: McGraw Hill, Seventh Edition 2010.
2. Jalote Pankaj, *An Integrated Approach to Software Engineering*, New Delhi:Pearson 2010.
3. Sommerville I., *Software Engineering*, Addison –Pearson, Eighth Edition 2009.

Course Title: System Software
Course Code: CSA217
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course get to students familiar with foundations of design of assemblers, loaders, linkers and macro processors.

Course Outcomes:

CO-1	Discuss system software and machine architecture.
CO-2	Comprehend assembler functions, algorithms, program relocation, one pass and multi pass assembler.
CO-3	Recognize linker and loader function.
CO-4	Familiarize with microprocessor functions and algorithms.
CO-5	Explore system software tools such as text editors, Interactive debugging systems, and debugging functions and capabilities

UNIT-A

Introduction **10 Hours**

- System Software and Machine Architecture: The Simplified Instructional Computer (SIC), Machine Architecture, Data and Instruction Formats, Addressing, Instruction Sets, I/O Programming.

UNIT-B

Assemblers **13 Hours**

- Basic Assembler Functions
- A simple SIC Assembler
- Assembler Algorithms and Data Structures
- Machine Dependent Assembler Features
- Instruction Formats and Addressing Modes
- Program Relocation, Literals, Symbol-Defining Statements, Expressions
- One Pass Assemblers and Multi Pass Assemblers
- Implementation Example -MASM Assembler.

UNIT-C **10 Hours**

Loaders and Linkers

- Basic loader functions**,** Design of an Absolute Loader
- A Simple Bootstrap Loader –Machine dependent loader features, Relocation, Program Linking Algorithm and Data Structures for Linki ng Loader
- Automatic Library Search, Loader Options, Loader design options, Linkage Editors, Dynamic Linking, Bootstrap Loaders Implementation example, MSDOS linker.

Macro Processors

- Basic macro processor functions, Macro Definition and Expansion, Macro Processor Algorithm and data structures, Machine independent macro processor features, Concatenation of Macro Parame

ters, Generation of Unique Labels,
Conditional Macro Expansion, Keyword Macro Parameters-
Macro within Macro Implementation example:
MASM Macro Processor, ANSIC Macro language.

UNIT-D **12 Hours**

System Software Tools

- Text editors, Overview of the Editing Process, User Interface, Editor Structure, Interactive debugging systems, Debugging functions and capabilities, Relationship with other part of the system, User-Interface Criteria.

Reference Books:

1. D. M. Dhamdhere, *Systems Programming and Operating Systems*, Second
2. Revised Edition, Tata McGraw-Hill, 2000.
3. John J. Donovan, *Systems Programming*, Tata McGraw-Hill Edition, 2000.
4. John R. Levine, *Linkers & Loaders*, Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000.
5. Leland L. Beck, *System Software – An Introduction to Systems Programming*, 3rd Edition, Pearson Education Asia, 2006.

Course Title: Computer Networks
Course Code: CSA218
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: Fundamental principles as well as the critical role of performance in driving protocol and network design; it explores in detail all the critical technical areas in data communications, and protocol design.

Course Outcomes:

CO-1	Interaction with different hardware devices present in computer networks and discuss various network models.
CO-2	Interaction with data link layer and its protocols.
CO-3	Interaction various Routing algorithms. In addition to that functionality of network layer.
CO-4	Functionality of Transport layer.
CO-5	Implementation of Application layer protocols in real-world scenarios.

UNIT – A **15 Hours**

Introduction to Data Communication

- Components of Data Communication, Data Representation
- Transmission Impairments, Switching, Modulation, Multiplexing

Review of Network Hardware

- LAN, MAN, WAN
- Wireless networks, Internetworks

Review of Network Software

- Layer, Protocols, Interfaces and Services

Review of Reference Models

- OSI, TCP/IP and their comparison

Physical Layer

- Transmission Media**:** Twisted pair, Coaxial cable, Fibre optics
- Wireless transmission (Radio, Microwave, Infrared)

UNIT – B **15 Hours**

Data Link Layer

- Error Correction and Detection
- Framing, Noiseless Channels and Noisy Channels
- Multiple Access Protocol
  (ALOHA, CSMA, CSMA/CD, CSMA/CA)
- Wired LANs

UNIT – C **15 Hours**

Network Layer

- Logical Addressing, Internet Protocol IPv4 and IPv6
- Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Hierarchical, Broadcast, Multicast)
- Internetworking, IP Protocol, ARP, RARP.

UNIT – D ***15 Hours***

Transport Layer

- Flow Control, Buffering
- Internet Transport Protocol (TCP and UDP)
- Congestion Control Algorithms (Leaky bucket, Token bucket, Load shedding)

Application Layer

- Domain name system, Email, File transfer protocol
- HTTP, HTTPS, World Wide Web.

Reference Books:

1. Tanenbaum. Andrew S. , *Computer Networks*, 4th Edition, New Delhi: PHI, 2013.
2. Forouzan B. A., *Data Communications and Networking*, Fourth Edition, New Delhi: Tata McGraw Hill, 2003.
3. Stalling W, *Data & Computer Communications*, New Delhi: PHI, Ninth Edition 2010.
4. Course Outcomes:

Course Title: Programming in C# Laboratory
Course Code: CSA216

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	To use of certain technologies by implementing them in the C # programming language to solve the given problem,
CO-2	To solving problems, starting from the acquired knowledge of programming and knowledge of operating systems.

- Implementation of OOPs Concepts
- Array and Strings
- Objects and Classes
- Inheritance
- Polymorphism
- Delegates and Events
- Exception Handling
- Windows Forms

L	T	P	Credits	Marks
0	0	4	2	50

Course Title: Data Structure Laboratory
Course Code: CSA219

Course Outcomes:

CO-1	Implement abstract data types using arrays and to analyze the various sorting and searching algorithms.
CO-2	Apply the different linear data structures like linked lists, stack and queues.
CO-3	Implement different types of trees and heaps and apply them to problem solutions
CO-4	Discuss graph and file structure and understand various operations on graphs and their applicability.

Implementation of Data Structures using C

- Implementation of various searching and sorting algorithms.
- Implementation of Arrays, Linked Lists, Stacks, Queues, etc.

Course Title: Computer Networks Laboratory
Course Code: CSA220

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	Identify and use various networking components
CO-2	Understand different transmission media and design cables for establishing a network
CO-3	Implement any topology using network devices
CO-4	Understand the TCP/IP configuration for Windows and Linux
CO-5	Learn the major software and hardware technologies used on computer networks

- Specifications of latest desktops and laptops.
- Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
- Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
- Preparing straight and cross cables.
- Study of various LAN topologies and their creation using network devices, cables and computers.
- Configuration of TCP/IP Protocols in Windows and Linux.
- Implementation of file and printer sharing.
- Designing and implementing Class A, B, C Networks
- Subnet planning and its implementation
- Installation of ftp server and client

Course Title: Operating Systems
Course Code: CSA303
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: Understand the overall architecture of the operating system and its main components, Functions of Kernel, file system architecture and implementation, concurrent programming and concurrency.

Course Outcomes:

CO-1	To identify the role of Operating System. To understand the design of control unit.
CO-2	To understanding CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms. Solve Deadlock Detection Problems.
CO-3	To describe the role of paging, segmentation and virtual memory in operating systems.
CO-4	To description of protection and security and also the Comparison of UNIX and Windows based OS.
CO-5	To defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms.

UNIT– A **15 Hours**

Introduction to Operating System

- OS, History of OS, Types of OS
- Functions/operations of OS, User services/jobs, system calls
- Traps, architectures for operating systems

Process Management

- Process overview, Process states
- Interrupt mechanism

UNIT – B **18 Hours**

CPU Scheduling and Process Synchronization

- Scheduling algorithms
- Pre-emptive scheduling & Non-Pre-emptive scheduling
- Levels of schedulers
- Process Synchronization, Critical section and mutual exclusion problem
- Classical synchronization problems, Multithreading.

System Deadlock

- Deadlock characterization, Deadlock prevention and avoidance
- Deadlock detection and recovery, practical considerations

UNIT– C **15 Hours**

Storage Management

- Storage allocation methods: Single contiguous allocation
- Multiple contiguous allocation

Memory Management

- Paging, Segmentation combination of Paging and Segmentation
- Virtual memory concepts, Demand Paging, Page replacement

Algorithms

- Thrashing. Address Protection,
- Cache memory, hierarchy of memory types, associative memory.

UNIT – D **12 Hours**

File Management

- Overview of File Management System
- Disk Space Management, Directory Structures
- Protection Domains, Access Control Lists, Protection Models
- Queue management, File and directory systems

Device Management

- Goals of I/O software, Design of device drivers, Device scheduling policies
- FCFS, SSTF, SCAN, CSCAN, LOOK, CLOOK

Reference Books:

1. Galvin and Silberschatz A., *Operating System Concepts*, Eigth Addition, New York: J. Wiley & Sons, 2009.
2. Crowley, *Operating Systems: A Design Oriented Approach*, New Delhi: Tata McGraw Hill, 2008.
3. Donovan J.J, *Systems Programming*, New York: McGraw Hill, 1972.
4. Dhamdhere. D.M, *System Programming and Operating Systems*, New Delhi: Tata McGraw Hill, 1999.
5. Madnick and Donovan, *Operating System*, New York: McGraw Hill, 1978.
6. Beck Leland L., *System Software*, Delhi: Pearson Education, 2000.
7. Henson P.B., *Operating System Principles*, Delhi: Prentice Hall
8. Tenenbaum A.S., *Operating System: Design and Implementation*, New Delhi: PHI, 2013.

Course Title: Web Engineering using ASP.NET
Course Code: CSA317
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To build web applications using ASP and client side script technologies use with Microsoft's IIS. To build XML applications with DTD and style sheets that span multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers.

Course Outcomes:

CO-1	To explain the three pillars of object oriented programming.
CO-2	To develop working knowledge of Standard Controls, validation controls and Rich controls.
CO-3	To learn to design Website with Master Pages, List Controls and Grid View Controls.
CO-4	To learn to work with SQL Data Source Control and Building Data Access Components with ADO.NET.

UNIT-A **12 Hours**

Introduction

- Overview of .NET Framework , Common Language Runtime (CLR)
- The .NET Framework Class Library, familiarization with visual studio .NET IDE, Design Window, Code Window, Server Explorer, Toolbox, Docking Windows, Properties Explorer, Solution Explorer, Object Browser, Dynamic Help, Task List Explorer.
- Features of .NET, XML Editor, Creating a Project, Add Reference, Build the Project, Debugging a Project.

UNIT-B

Introduction to Standard Controls

- Display information, Accepting user input, Submitting form data,
- Displaying images,
- Using the panel control, using the hyperlink control.

Introduction to Validation Controls

- Using the required field validator control, using the range validator control, using the compare validator control, using the regular expression validator control, using the custom validator control, using the validation summary controls.

Introduction to Rich Controls

- Accepting file uploads, Displaying a calendar, Displaying advertisement, Displaying different page views.

UNIT-C **12 Hours**

Designing Website with Master Pages

- Creating master pages, Modifying master page content, and Loading master page dynamically.

List Controls

- Dropdown list control, Radio button list controls, list box controls, bulleted list controls, custom list controls.

Grid View Controls

- Grid view control fundamentals,
- Using field with the grid view control, working with grid view control events extending the grid view control.

UNIT-D **10 Hours**

SQL Data Source Control

- Creating database connections, Executing database commands,
- Using ASP.NET parameters with the SQL data source controls, programmatically executing SQL data source commands

Building Data Access Components with ADO.NET

- Connected data access
- Disconnected data access
- Executing a synchronous database commands, Building database objects with the .NET framework.

Reference Books:

1. Paul J. Deitel and Harvey M. Deitel, *C# 2010 for Programmers*, Forth Edition New Delhi: Pearson 2010.
2. Imar Spaanjaars, *Beginning ASP.NET 4: in C# and VB (Wrox)*, Paperback Edition, 2010.
3. George Shepherd, *Microsoft ASP.NET 4 Step by Step (Microsoft)*, Paperback Edition, 2010.
4. Scott Mitchell, *Teach Yourself ASP.NET 4 in 24 Hours*, Complete Starter Kit.

Course Title: Data Warehousing and Mining
Course Code: CSA314
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course provides the knowledge to students about the data warehousing and data mining techniques, data mining software and tools being used in industries.

Course Outcomes:

CO-1	To provide the student with an understanding of the concepts of data warehousing.
CO-2	To study the dimensional modelling technique for designing a data warehouse.
CO-3	To describe the data mining tasks and study their well-known techniques.
CO-4	To understand the concept of clustering and different cluster analysis methods.

UNIT—A **10 Hours**

Introduction

- The need for data warehousing
- Operational & Informational Data Stores
- Data Ware house Characteristics, Data Warehouse role & Structure, The cost of warehousing data

Introduction to OLAP & OLTP: Difference between OLAP & OLTP. OLAP Operations

UNIT—B **13 Hours**

- Building a Data Warehouse
- Design/Technical/Implementation Considerations
- Data Pre-processing Overview: Data Summarization, Data Cleaning, Data Transformation, Concept Hierarchy, Structure.
- Overview of Patterns & Models and Artificial Intelligence
- Multidimensional Data Model, Schemas for Multidimensional Data (Star Schema, Snowflake Schema, Fact Constellation.

UNIT—C **12 Hours**

Data Mining

- Association Rule Mining, Market Basket Analysis, Apriori Algorithm, Mining Multilevel Association Rules, From Association Mining to Correlation Analysis, Constraint Based Association Mining,
- Introduction to Classification, Classification by decision Tree, Attribute Selection Measure

UNIT—D **10 Hours**

Introduction to Prediction techniques

- Accuracy of a Classifier
- Cross-Validation, Bootstrap, Boosting, Bagging
- Introduction to Clustering, Classification of Various Clustering Algorithms, Selecting and Using Right DM Technique, Selecting and Using Right DM Technique, Data Visualization.

Reference Books:

1. Inmon W. H., *Building the Data Warehouse*, New York: John Wiley 2002.
2. Inmon W. H.,*Data Warehousing and Knowledge Management*, ork: New YJohn Wiley 1996.
3. Romez Elmasri, Shamkant B., Navathe,*Fundamentals of Database Systems*, New Delhi:Pearson Education, 2009.
4. Han, Kamber, Morgan Kaufmann, *Data Mining: Concepts and Techniques*, 2nd Edition, Elsevier, 2012.
5. Inmon, W.H., C. L. Gassey,*Managing the Data Warehouse*, New York:John Wiley 1999.
6. Fayyad, Usama M., *Advances in Knowledge Discovery and Data Mining*, MIT Press, 1996.
7. Silberschatz, Korth andSudershan,*Database System Concepts*, New Delhi: McGraw Hill, 4th Edition, 2010.

Course Title: Programming in Python
Course Code: CSA315
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course provides the knowledge about developing programs and scripts using Python programming language. All the advanced concepts of programming will help benefit the students in research as well in software development.

Course Outcomes:

CO-1	To acquire programming skills in core Python.
CO-2	To acquire the skills of using operators and working with control constructs in Python.
CO-3	To develop the skills of using data types and creating & designing functions & modules and object oriented programming in Python.
CO-4	To acquire object oriented programming, File handling and Exception Handling Skills in Python.

UNIT-A

Introduction to Python Language **15 Hours**

- Programming language, History of Python, Origin of Python Programming, Features, Limitations, Applications, Getting and Installing Python, Python Environment Variables, Python Help, Python differences from other languages.

Python Data Types and Input Output

- Keywords, Identifiers, Variables, Statements, Indentation, Documentation, Data Type, Type Conversion.
- Python Input and Output.

UNIT-B **15 Hours**

Operators and Expressions

- Arithmetic, Comparison, Assignment, Logical, Bitwise, and Python special operators.
- Expressions, Precedence and Associativity.

Control Structures

- Decision Making Statements
- Python Loops
- Python Control Statements

UNIT-C **15 Hours**

Python Native Data Types

Creation of following Data Types along with methods and functions

- Number, String, Tuple
- Set, Dictionary

Python Functions and Modules

- Creating Functions, Advantages of Functions, Types of Functions, Built-In, User Defined Functions, Anonymous Functions, Call by

Value, Call by Reference, Recursion, Designing of Modules, Importing Modules.

UNIT-D **15 Hours**

Python Class and Objects

- Designing Classes, Creating Objects, Accessing Objects, init method, constructor, garbage collection, destroying objects, inheritance and operator overloading.

File Handling

- File creation, open() and close() methods, read() and write() methods, file modes, file encoding, file object attributes, renaming and deleting files, Python directory, directory methods and functions.

Exception Handling

- Python Exception, Built-in Exception, Exception Handling, Try, except, finally, Python user defined exceptions.

Reference Books:

1. M. C. Brown, The Complete Reference Python, Osborne/McGraw-Hill, 2001.
2. S. Maruch, A. Maruch, Python for Dummies, John Wiley & Sons, 2011.
3. A. B. Downey, Think Python, O'Reilly Media Inc., 2012.
4. B. Slatkin, Effective Python, Addison Wesley Professional, 2015.
5. J. M. Zelle, Python Programming: An Introduction to Computer Science, Franklin, Beedle & Associates, Inc., 2004.

Course Title: Discrete Mathematics
Course Code: CSA316
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The objective of this course is to acquaint the students with the basic concepts in Discrete Mathematics viz. sets, functions, relations, groups, graphs etc required for the implementation of various computer science courses.

Course Outcomes:

CO-1	To acquaint the students with the basic concepts of set, relation and function.
CO-2	To acquaint the students with the basic concepts of Pigeonhole principle and permutation and combination.
CO-3	To acquaint the students with the basic concepts of recursive relation and generating functions.
CO-4	To acquaint the students with the basic concepts graph theory.
CO-5	To acquaint the students with the basic concepts of Inference theory.

UNIT—A **12 Hours**

Introduction

- Introduction to Sets
- Finite and Infinite Sets, Unaccountably Infinite Sets.
- Introduction to Functions and relations, Properties of Binary relations, Closure, Partial Ordering Relations.

UNIT—B **10 Hours**

- Pigeonhole Principle
- Permutation and Combinations, Mathematical Induction, Principle of Inclusion and Exclusion
- Asymptotic Notations

UNIT—C **15 Hours**

Recurrence Relations

- Introduction, Generating Functions, Linear Recurrence Relations with constant coefficients and their solution

Graphs Theory

- Basic Terminology of Graphs, Models and Types, Multigraphs, Weighted Graphs, Graph Representation. Graph Isomorphism Graph Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Basic Terminology of Trees, Properties of Trees, Spanning Trees.

UNIT—D **8 Hours**

Inference Theory

- Introduction, Logical Connectives, Well Formed Formulas, Tautologies, Equivalence

Reference Books:

1. C. L. Liu and D.P. Mohapatra, *Elements of Discrete Mathematics*, Third Edition, Tata McGraw Hill, 2008.
2. K. Rosen, *Discrete Mathematics and Its Applications*, Sixth Edition, Tata McGraw Hill,2007.
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest, *Introduction to Algorithms*, Third Edition,Prentice Hall of India,2010.
4. J.P. Trembley, R. Manohar, *Discrete Mathematical Structures with Application to Computer Science*, First Edition, Tata McGraw Hill, 2001.
5. David Gries, Fred B. Schneider, *A Logical Approach to Discrete Math,* Springer; 2010.

Course Title: Data Warehousing and Mining
Course Code: CSA314
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: This course provides the knowledge to students about the data warehousing and data mining techniques, data mining software and tools being used in industries.

Course Outcomes:

CO-1	To study about data warehouse principles and its working.
CO-2	To learn data mining concepts and understand Association Rule Mining.
CO-3	To study about Classification Algorithms
CO-4	To gain knowledge of how data is grouped using clustering techniques.

UNIT—A **10 Hours**

Introduction

- The need for data warehousing
- Operational & Informational Data Stores
- Data Ware house Characteristics, Data Warehouse role & Structure, The cost of warehousing data

Introduction to OLAP & OLTP: Difference between OLAP & OLTP. OLAP Operations

UNIT—B **13 Hours**

- Building a Data Warehouse
- Design/Technical/Implementation Considerations
- Data Pre-processing Overview: Data Summarization, Data Cleaning, Data Transformation, Concept Hierarchy, Structure.
- Overview of Patterns & Models and Artificial Intelligence
- Multidimensional Data Model, Schemas for Multidimensional Data (Star Schema, Snowflake Schema, Fact Constellation.

UNIT—C **12 Hours**

Data Mining

- Association Rule Mining, Market Basket Analysis, Apriori Algorithm, Mining Multilevel Association Rules, From Association Mining to Correlation Analysis, Constraint Based Association Mining,
- Introduction to Classification, Classification by decision Tree, Attribute Selection Measure

UNIT—D **10 Hours**

Introduction to Prediction techniques

- Accuracy of a Classifier
- Cross-Validation, Bootstrap, Boosting, Bagging
- Introduction to Clustering, Classification of Various Clustering Algorithms, Selecting and Using Right DM Technique, Selecting and Using Right DM Technique, Data Visualization.

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1. Inmon W. H., *Building the Data Warehouse*, New York: John Wiley 2002.
2. Inmon W. H.,*Data Warehousing and Knowledge Management*, ork: New YJohn Wiley 1996.
3. Romez Elmasri, Shamkant B., Navathe,*Fundamentals of Database Systems*, New Delhi:Pearson Education, 2009.
4. Han, Kamber, Morgan Kaufmann, *Data Mining: Concepts and Techniques*, 2nd Edition, Elsevier, 2012.
5. Inmon, W.H., C. L. Gassey,*Managing the Data Warehouse*, New York:John Wiley 1999.
6. Fayyad, Usama M., *Advances in Knowledge Discovery and Data Mining*, MIT Press, 1996.
7. Silberschatz, Korth andSudershan,*Database System Concepts*, New Delhi: McGraw Hill, 4th Edition, 2010.

Course Title: Basics of Artificial Intelligence
Course Code: CSA320
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective The objective of this course is to familiarize students with concepts of AI, its tools & technologies.

Course Outcomes:

CO-1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) nd its foundations.
CO-2	Apply basic principles of AI in solutions that require problem solving, inference, erception, knowledge representation, and learning.
CO-3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other nachine learning models.
CO-4	Demonstrate proficiency developing applications in an 'AI language', expert system hell, or data mining tool.

UNIT – A **10 Hours**

Introduction

- Background and History
- Overview of AI applications Areas

Knowledge Representation

- Network Representation-Associative Network & Conceptual Graphs
- Structured Representation- Frames & Scripts

UNIT – B **13 Hours**

Search Strategies

- Strategies For State Space Search-Data Driven And Goal Driven Search
- Search Algorithms- Uninformed Search (Depth First, Breadth First, Depth First With Iterative Deepening) And Informed Search (Hill Climbing, Best First, A* Algorithm, etc)

Expert Systems

- Introduction, Examples
- Characteristics Architecture, People Involved and Their Role in Building an Expert Systems

UNIT – C ***12 Hours***

Natural Language Processing

- Introduction to Natural Language Processing
- Component Steps of Communication
- Contrast Between Formal and Natural Languages in the Context of Grammar

Introduction to AI languages

- Introduction to LISP and Prolog

UNIT-D **10 Hours**

Planning

- Basic Representation for Planning
- Symbolic-Centralized Vs. Reactive-Distributed

Pattern Recognition

- Introduction
    - Recognition & Classification Process
    - Learning classification patterns and clustering

Reference Books:

1. Elaine Rich,Kevin Knight and Nair Shiva Shankar B,*Artificial Intelligence*, Third Edition, New Delhi: Tata-McGraw Hill, 2008.
2. Winston, P.H. and Horn, B.K.P, *LISP*, Pearson, 1993.
3. Rajasekharan, S. and VijayalakshmiPai, G. A.,*Neural Networks, Fuzzy Logic and Genetic Algorithms*, New Delhi: Prentice Hall of India, 2003.
4. Luger George F., *Artificial Intelligence*, 5th edition, Pearson Education.
5. Patterson Dan W.,*Introduction to Artificial Intelligence and Expert syste*, New Delhi: PHI, 2005.
6. Bharti &Chaitany,*Natural Language Processing*, New Delhi: PHI, 2006.

Course Title: Introduction to Internet of Things
Course Code: CSA321
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Outcomes:

CO-1	Understand the concepts of Internet of Things.
CO-2	Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
CO-3	Design IoT applications in different domain and be able to analyze their performance
CO-4	Able to understand the application areas of IOT .

- Vision and Introduction to IoT.
- Data and Knowledge Management and use of Devices in IoT Technology.
- Understand State of the Art – IoT Architecture.

UNIT-A

Introduction to IoT **12 Hours**

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models &APIs

UNIT-B

IoT & M2M **13 Hours**

Machine to Machine, Difference between IoT and M2M, Software Defined Network

Network & Communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

UNIT-C

Challenges in IoT **10 Hours**

Design challenges, Development challenges, Security challenges, other challenges

UNIT-D

Domain specific applications of IoT **10 Hours**

Home automation, Industry applications, Surveillance applications, Other IoT applications.

Reference Books:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands On Approach.”
2. WaltenegusDargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice.”

Course Title: Web Engineering using ASP.NET Laboratory
Course Code: CSA312

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	To create user interactive web pages using ASP.Net.
CO-2	To create simple data binding applications using ADO.Net connectivity.
CO-3	To performing Database operations for Windows Form and web applications.

- HTML tags
- DHTML: CSS Style Sheets
- JavaScript basics, constructs and functions
- VB Scripting basics, constructs and functions

L	T	P	Credits	Marks

0	0	4	2	50

Course Title: Programming in Python Laboratory
Course Code: CSA318

Course Outcomes:

CO-1	To describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics, science, and games.
CO-2	To examine the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.
CO-3	To identify the external modules for creating and writing data to excel files and inspect the file operations to navigate the file systems.

Implementation of Python programs: Control Structures, Lists, Tuples, Strings, Dictionary, Sets, Files, Exception handling, Classes and Objects, Inheritance, Overloading, etc.

Course Title: Workshop on App Development
Course Code: CSA319
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	Discuss android history, versions, installation and different development tools.
CO-2	Describe UI Widgets and Activity, Intent and Fragment.
CO-3	Introduce android Menu and Layout Manager.
CO-4	Understand android service and data storage, and SQLite, XML & JSON.
CO-5	Learn content provider fundamentals and multimedia.

Introduction and its Significance

- What is Android, History of Android, Importance of Java Language for Android apps, other mobile OS-es, Android versions and different development tools.
- Installing software's and Setup Eclipse.

UI Widgets and Activity, Intent & Fragment

- Working with Button,Toast, CustomToast, Button, Toggle Button, SwitchButton, Image Button, CheckBox, Alert Dialog, Spinner, AutoCompleteTextView, RatingBar, DatePicker, TimePicker, ProgressBar, Quick Contact Budge, Analog Clock and Digital Clock Working with hardware Button File Download.

Android Menu and Layout Manager

- Option Menu , Context Menu and Popup Menu
- Relative Layout, Linear Layout, Table Layout and Grid Layout

Android Service and Data storage

- Android Service, Android Service API,Android Started Service, Android Bound Service,Android Service Life Cycle and Android Service Example
- Shared Preferences Internal Storage and External Storage

SQLite, XML & JSON

- SQLite API, SQLite Spinner and SQLite List View
- XML Parsing SAX, XML Parsing DO, XML Pull Parser and JSON Parsing

Content Provider and Multimedia

- Content Provider Fundamental, Notification API, Creating Notification Builder, Playing Audio, Location API, Working with Camera, Motion Sensor, Android P2P Communication and Android Google Map

Reference Books:

1. Os Swift, "Android App Development & Programming Guide: Learn in a Day", CreateSpace Independent Publishing Platform (October 2, 2015).
2. David Griffiths and Dawn Griffiths, "Head First Android Development: A Brain-Friendly Guide", Shroff (1 January 2015).
3. Ted Hagos "Learn Android Studio 3 with Kotlin: Efficient Android App Development", Apress media LLC, Newyork, 2018.

4. Zigurd Mednieks, G. Blake Meike, Laird Dornin, Masumi Nakamura, "Programming Android: Java Programming for the New Generation of Mobile Devices", 2nd Edition, Kindle Edition, O'Reilly Media; 2 edition (28 September 2012).

Course Title: Core JAVA
Course Code: CSA302
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To provide the advanced Knowledge about OOPS.

Course Outcomes:

CO-1	To gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
CO-2	To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc. and exception handling mechanisms.
CO-3	To understand the principles of inheritance, packages and interfaces.
CO-4	To learn the concept of Exception handling and Multithreading
CO-5	Understand the concept of String handling functions and basics of Applet Programming

UNIT—A

An overview of Java **15 Hours**

- Object Oriented Programming, Two Paradigms
- Abstraction, The, OOP Principles, Java Class Libraries
- Date Types, Variables And Arrays:-Integers, Floating-Point Types, Characters, Boolean, Iterates, Variable, Data Types And Casting
- Automatic Type Promotion in Expressions Arrays.
- Operators: Arithmetic Operators, Bit Wise Operators, Relational Operators
- Boolean Logical Assignment Operators, The? Operator, Operator Precedence Control Statements
- Java's Selection Statements, Iteration Statements, Jump Statements
- Introduction to Classes: Class Fundamentals, Declaring Object Reference Variable

UNIT—B **10 Hours**

Introducing Methods

- Constructors, The Key Word, Garbage Collection, The Finalize () Method
- Methods And Classes :-Overloading Methods, Using Objects As Parameters, Recursion

Inheritance:

- Inheritance Basics, Using Super, Method Overriding, Dynamic MethodDispatch
- Using Abstract Classes, Using Final With Inheritance, Package and Interfaces
- Package Asses Protection, Importing Packages

UNIT—C **10 Hours**

Exception Handling:

- Exception Handling Fundamentals., Exception Types
- Uncaught Exceptions Using Try and Catch, Multiple Catch Clauses, Nested Try Statements Throw

- Finally Java Built in Exception Creating Your own Exception Sub Classes, Using Exceptions

Multithreaded Programming:

- The Java Thread Model, The Main Thread, Creating Thread, Creating Multiple Thread, Using Is Alive () and Join ()

UNIT—D **10 Hours**

String Handling:

- The String Constructor, String Length, Special String Operator Character
- Extraction, String Comparison, Searching String, Modifying String, Data Conversion

The Applet Class:

- Its Architecture Displays Methods. The HTML APPLET.
- Passing Parameters to Applet. The Get Documentation Base () and Get Code Base () Methods
- Applet Context And Show Document ()

Reference Books:

1. Eckel Bruce ,*Thinking in Java*, Pearson Education, Fourth Edition, 2006.
2. Schildt Herbert, *The Complete Reference Java 2*, New Delhi: TMH, 2005.
3. Balagurusami E, *Programming In Java*, New Delhi: Tata McGraw Hill Fourth Edition.
4. Bayross Ivan, *Advance Java*, New Delhi:BPB Publications.
5. *Mastering Java*, New Delhi:BPB Publications, Second Edition.

Course Title: Computer Graphics and Multimedia
Course Code: CSA309
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Objectives: The objective of the study is to let students understand basics of computer graphics, input/output primitive and basic transformations, which can be applied on objects of graphics.

Course Outcomes:

CO-1	Introduction to computer graphics and various display devices.
CO-2	To provide knowledge of various line drawing and circle drawing algorithms.
CO-3	To provide knowledge of various types of transformations and clipping algorithms.
CO-4	To provide knowledge various multimedia platforms like image, sound and videos

UNIT – A **10 Hours**

Overview of Graphics Systems

- Video Display Devices
- Raster Scan Systems, Random Scan Systems.
- Graphics Monitors and Workstations,
- CRT Monitors (Random – Scan and Raster Scan, DVST, Plasma – PanelDisplay
- LED and LCD Monitors.

UNIT-B **12 Hours**

Scan Conversion

- Scan Conversion Algorithms For Line, Circle and Ellipse
- Effect of Scan Conversion
- Bresenham's Algorithms for Line and Circle Along with Their Derivations
- Midpoint Circle Algorithm, Area Filling Techniques, Flood Fill Techniques Character Generation

Two Dimensional Transformations

- Basic Transformations,Ceiling, Translation, Rotation, Deflection,
- Skew Matrix representation of Basic transformations
- Homogenous Coordinates.
- Composite Transformations.

UNIT – C **12 Hours**

Viewing Transformations

- Windowing and Clipping, Windowing Concedes, Clipping and its Algorithms.
- Window–to–View Port Transformations

Three Dimensional Concepts

- 3 D Coordinate Systems
- 3 D transformations: Translation, Scaling, Rotation
- Projections: Parallel Projections, Perspective Projection

UNIT – D **12 Hours**

Technology System Components

- Multimedia Platforms
- Development Tools, Image, Audio
- Video, Storage for Multimedia, Communications

Applications

- Multimedia in the Real World, Training and Education
- Image Processing

Reference Books:

1. D. Hearn and M.P. Baker, *Computer Graphics*(2nd ed.), New Delhi: Prentice–Hall of India, 2004.
2. Foley. J.D., Dam A van, FeinerS.K. andHughes J.F., *Computer Graphics: Principals and Practices*(2nd ed.), Addison-Wesley, MA, 1990.
3. Rogers D.F., *Procedural Elements in Computer Graphics (2nd ed.),* New Delhi:McGraw Hill Book Company, 2001.
4. PlastockRoy A., KalleyGordon,*Computer Graphics*, New Delhi: McGraw Hill Book Company, 1996,

Course Title: Digital Image Processing
Course Code: CSA321
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: To introduce basic image processing techniques, spatial and frequency domain, linear programming, color image processing, image compression, etc.

Course Outcomes:

CO-1	To understand the need for image transforms different types of image transforms and their properties.
CO-2	To study binarization and Segmentation of Grey level images.
CO-3	To develop any image processing application.
CO-4	To develop algorithms for image registration and image compression.

UNIT – A **15 Hours**

Introduction

- A simple image model, Sampling and Quantization
- Imaging Geometry, Digital Geometry, Image Acquisition Systems, Different types of digital images.
- Bilevel Image Processing: Basic concepts of digital distances, distance transform, medial axis transform, component labeling, thinning, morphological processing, extension to grey scale morphology.

UNIT – B **15 Hours**

Binarization and Segmentation of Grey level images

- Histogram of grey level images, Optimal thresholding using Bayesian classification, multilevel thresholding, Segmentation of grey level images, Water shade algorithm for segmenting grey level image.
- Detection of edges and lines in 2D images: First order and second order edge operators, multiscale edge detection, Canny's edge detection algorithm, Hough transform for detecting lines and curves, edge linking.

UNIT – C **15 Hours**

Image Enhancement

- Point processing, Spatial Filtering, Frequency domain filtering, multi-spectral image enhancement, image restoration.
- Color Image Processing: Color Representation, Laws of color matching, chromaticity diagram, color enhancement, color image segmentation, color edge detection, color demosaicing.

Applications of Image Processing

- Picture Data Archival
- Machine Vision
- Medical Image Processing

UNIT-D **15 Hours**

Imag Registration and Depth Estimation

- Registration Algorithms, Setreo Imaging, Computation of disparity

map.

- Image compression: Lossy and lossless compression schemes, prediction based compression schemes, vector quantization, sub-band encoding schemes, JPEG compression standard, Fractal compression scheme, Wavelet compression scheme.

Reference Books:

1. Gonzalez Rafael C. and Woods Richard E., *Digital Image Processing*, New Delhi: Prentice–Hall ofIndia, 2002.
2. Pratt William K., *Digital Image Processing: PIKS Inside*(3rd ed.), New Jersy: John Wiley & Sons, Inc., 2001.
3. Bernd Jahne, *Digital Image Processing*, (5th revised and extended edition), Springer, 2002
4. Annadurai S. and Shanmugalakshmi R., *Fundamentals of Digital Image Processing*, New Delhi: Pearson Education, 2007
5. Joshi M.A., *Digital Image Processing: An Algorithmic Approach*, New Delhi: Prentice-Hall ofIndia, 2006

Course Title: Machine Learning
Course Code: CSA322
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objective: The main objective of this course is to acquaint students with an in-depth introduction to two main areas of Machine Learning: supervised and unsupervised. Some of the main models and algorithms for regression, classification, and clustering will be covered.

Course Outcomes:

CO-1	Develop an appreciation for what is involved in learning models from data.
CO-2	Understand a wide variety of learning algorithms.
CO-3	Understand how to evaluate models generated from data
CO-4	Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

UNIT-A **15 Hours**

- **Machine Learning:** Meaning, definition and applications of machine learning

Introduction of data in machine Learning: Training data, Validation data, Testing data, Properties of data

- History of machine learning, Steps involved in a machine learning project

Building a machine learning model: representing training examples, target function, representation of target function, learning algorithms

UNIT-B **12 Hours**

- **Types of machine learning**: supervised learning, unsupervised learning, reinforcement learning.
- **Supervised Learning**: Basic concept of Classification, Regression ,Types of regression techniques
- **Decision Tree Learning**: Decision tree representation, appropriate problems for decision tree learning, building decision trees, principles of information gain and entropy. Instance based learning and feature selection, k-nearest neighbour algorithm.

UNIT-C **10 Hours**

- **Unsupervised Learning**: Clustering, different types of clustering algorithms(K-means clustering ,K-means++ clustering, Density Based clustering algorithm)
- **Reinforcement Learning**: Introduction, reinforcement learning algorithms Introduction to pattern recognition

UNIT-D **8 Hours**

- Statistical methods for Pattern Recognition Bayes Decision Theory, Minimum Error and Minimum Risk Classifiers, Discriminant Function and Decision Boundary ,Normal Density, Discriminant Function for Discrete Features, Parameter Estimation.

Reference Books:

1. Tom M. Mitchell, Machine Learning, McGraw Hill Education.
2. Ethem Alpaydin, Introduction to Machine Learning, PHI.
3. Shai Shalev-Shwartz, Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press.

Course Title: Cloud Computing
Course Code: CSA323
Course Duration: 45-60 Hours

L	T	P	Credits	Marks
4	0	0	4	100

Course Objectives:

- To understand the emerging area of "cloud computing" and how it relates to traditional models of computing.
- To gain competence in Map Reduce as a programming model for distributed processing of large datasets.

Course Outcomes:

CO-1	Understand the fundamental principles of distributed computing.
CO-2	Understand how the distributed computing environments known as Grids can be built from lower level services.
CO-3	Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
CO-4	Understand cloud platform and management.

UNIT—A **15 Hours**

Overview of Computing Paradigm

- Recent trends in Computing
- Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing

Evolution of cloud computing

- Business driver for adopting cloud computing
- Introduction to Cloud Computing
- Cloud Computing (NIST Model)
- Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers
- Properties, Characteristics & Disadvantages
- Role of Open Standards

UNIT—B **10 Hours**

Infrastructure as a Service(IaaS)

- Introduction to IaaS
- IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM)

UNIT—C **10 Hours**

Platform as a Service(PaaS)

- Introduction to PaaS
- What is PaaS, Service Oriented Architecture (SOA)
- Cloud Platform and Management

UNIT—D **10 Hours**

Software as a Service(SaaS)

- Introduction to SaaS
- Web services
- Web 2.0
- Web OS
- Case Study on SaaS

Reference Books:

1. Barrie Sosinsky, *Cloud Computing Bible*, New Delhi: Wiley-India, 2010
2. BuyyaRajkumar , BrobergJames , Goscinski Andrzej M., *Cloud Computing: Principles and Paradigms*, Wiley, 2011
3. Antonopoulos Nikos, GillamLee, Cloud Computing: Principles, Systems and Applications, Springer, 2012
4. KrutzRonald L, Vines Russell Dean,*Cloud Security: A Comprehensive Guide to Secure Cloud Computing*,New Delhi: Wiley-India, 2010

Course Title: Computer Graphics Laboratory
Course Code: CSA311

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	To implementation of a project based on learned concepts.
CO-2	To implementation of various scan & clipping algorithms
CO-3	To representation concepts of 2D & 3D object.

Implementation of Graphics Functions

- Algorithms Implementation (line, circle, ellipse)
- 2D transformation Implementation

Course Title: Core Java Programming Laboratory
Course Code: CSA308

L	T	P	Credits	Marks
0	0	4	2	50

Course Outcomes:

CO-1	To development environment to write, compile, run, and test simple object-oriented Java programs.
CO-2	To read and make elementary modifications to Java programs that solves real-world problems.
CO-3	To validate input in a Java program.
CO-4	To identify and fix defects and common security issues in code.

- Implementation of OOP concepts using JAVA
- Packages and Interfaces
- Exception Handling
- Applets
- AWT classes