BIRLA INSTITUTE OF TECHNOLOGY MESRA

RANCHI, INDIA

CHOICE BASED CURRICULUM

Computer Science and Engineering

U.G. Programme

(Bachelor of Computer Applications)

Department of Computer Science & Engineering
Birla Institute of Technology, Mesra, Ranchi - 835215 (India)

Institute Vision

To become a Globally Recognized Academic Institution in consonance with the social, economic and ecological environment, striving continuously for excellence in education, research and technological service to the National needs.

Institute Mission

- To educate students at Undergraduate, Postgraduate Doctoral and Post-Doctoral levels to perform challenging engineering and managerial jobs in industry.
- To provide excellent research and development facilities to take up Ph.D. programmes and research projects.
- To develop effective teaching and learning skills and state of art research potential of the faculty.
- To build national capabilities in technology, education and research in emerging areas.
- To provide excellent technological services to satisfy the requirements of the industry and overall academic needs of society.

Department Vision

The department strives to be recognized for outstanding education and research, leading to excellent professionals and innovators in the field of Computer Science and Engineering, who can positively contribute to the society.

Department Mission
- To impart quality education and equip the students with strong foundation that could make them capable of handling challenges of the new century.
- To maintain state of the art research facilities and facilitate interaction with world's leading universities, industries and research organization for constant improvement in the quality of education and research.

Program Educational Objectives (PEOs)

PEO1: To excel in software development skills coveted in the IT industry.

PEO2: To be well prepared for pursuing higher studies in related fields of teaching and research.

PEO 3: To be aware of the requirements of being an ethical and professional leader and inculcating team spirit.

PEO4: To inculcate the ability to innovate and contribute towards the growth of the nation.

Programme Outcomes(POs)

PO1: Attain problem solving attitude in systematic and timely manner.

PO2: Apply knowledge of mathematics, algorithm and computing principles appropriately to solve real-world problems.

PO3: Identify modern tools and techniques through critical thinking for solving complex problems.

PO4: Use the computational resources efficiently to develop software for the industry need.

PO5: Understand and assess societal, environmental, safety, legal and ethical norms for professional computing practices.

PO6: Function as an individual or as a member in team in the software domain.

PO7: Recognize the need for self-motivation, learning and unlearning to engage in life-long learning for continual development.

PO8: Excel in descriptive oral, written communication and presentation skills required for documenting and delivering project artefacts effectively.

COURSE INFORMATION SHEET

Course code: CA101
Course title: PROBLEM SOLVING AND PROGRAMMING IN C
Pre-requisite(s):
Co- requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

1.	Understand the fundamentals of C programming.
2.	Learn about different problems and the approach to solve them.
3.	Gain proficiency with the fundamental concepts of the C programming language
4.	Be able to apply these concepts to solve real world problems
5.	Able to program in C programming for a given application

Course Outcomes:
After the completion of this course, students will be able to:

CO1	Choose the loops and decision-making statements to solve the problem.
CO2	Implement different Operations on arrays.
CO3	Use functions to solve the given problem.
CO4	Understand pointers, structures and unions.
CO5	Implement file Operations in C programming for a given application.

SYLLABUS

Module I:
Problem Solving and Programming Concepts: Problem Solving in Everyday Life, Types of Problem, Problem Solving with Computers.
Overview of C: History of C, Importance of C, Structure of C program, Sample of C programs. Constant, Variable and Data types: C Tokens – keywords, identifier, constant, string, and operators, and symbols, Data types – primary data types, user defined data types, and derived data types, Declaration of variables, assign values to variables.
Operators and Expressions: Different types of operators – arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, bitwise operators, conditional operators and special operators, Arithmetic expressions – precedence of arithmetic operators, Type conversions in expressions.
Managing input and output operations: Reading a character, Writing a character, Formatted input, Formatted output.

(8L)

Module II:
Decision making and Branching: Decision making with if statement – Simple if statement, The if …. Else statement, Nesting of if …. Else statement, The else if ladder, The switch statement, The ? : Operator, The go-to statement.
Decision making and Looping: The while statement, The do statement, The for statement, Jumps in loops.

(8L)

Module III:
Arrays: One - dimensional arrays, Declaration of one – dimensional arrays, Two – dimensional arrays, Declaration of two – dimensional arrays, Multi – dimensional arrays.
Character Arrays and String: Declaring and initializing string variables, Reading string from terminal, Writing string to screen, Putting string together, Comparison of two strings, String handling functions, Other features of strings.

(8L)

Module IV:
User defined functions: A multi – function program, Definition of function, Function calls, Function declaration, Category of functions, Nesting of functions, Recursion, Passing arrays to functions, Passing strings to functions

(8L)

Module V:
Structures and Unions: Defining a structure, Declaring structure variables, Accessing structure members, Arrays of structures, Arrays within structures, Structures within structures, Structures and functions, Union.
Pointers: Understanding pointers, Accessing the address of a variable, Declaring pointer variables, Pointer expressions, Array of pointers, Pointers to function, Pointers and structures.
File Management: Defining and opening a file, Closing a file, Input/Output operations on files, Error handling during I/O operations

(8L)

Books recommended:

TEXT BOOK
1. Balagurusamy E., "Programming in ANSI C", 5thEdition, TMH, 2010.**(T1)**
2. Sprankle M., "Problem Solving and Programming Concepts", 7thEdition, Pearson Education, New Delhi, 2006.**(T2)**

REFERENCE BOOK
1. Gottfried B. S., "Programming with C", Schaum Series, McGraw Hill, 2005. **(R1)**
2. Kanetkar Y., "Let us C", 4th Edition, BPB publication, New Delhi, 2002.**(R2)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
    1. Student Feedback on Faculty
    2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	2	1	2	1
CO2	3	2	1	1	1	3	2	1
CO3	3	3	2	1	1	3	1	1
CO4	3	3	2	3	1	2	1	1
CO5	3	3	2	3	1	1	1	1

< 34% = 1, 34-66% = 2, > 66% = 2

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,CD6,CD7
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD3,CD4,CD5,CD7

COURSE INFORMATION SHEET

Course code: CA103
Course title: LOGICAL ORGANIZATIONS OF COMPUTERS
Pre-requisite(s): Basic Electronics
Co- requisite(s):
Credits: 4   L:3   T:1   P:0
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

1.	Understand the Truth Table.
2.	Identify the number of variables and their simplification importance.
3.	Understand different circuits for the implementation of Boolean equations.
4.	Identify Register Transfer, Micro-operations and Central Processing Unit
5.	Describe performance evaluation of computers, computer architecture and organization, computer arithmetic, Memory and CPU design.

Course Outcomes
After the completion of this course, students will be able to:

CO1	Minimize the circuit diagrams by use of K-Map concepts and Boolean Algebra.
CO2	Analyse the outcome of the circuit designed.
CO3	Create complex circuit with use of modular block interconnection.
CO4	Analyse I/O system and interconnection structures of computer.
CO5	Develop independent learning skills and be able to learn more about different computer architectures and hardware.

SYLLABUS

Module I:
Digital Logic Circuits: Digital Computers, Logic Gates, Boolean algebra, Complement of a Function, Map Simplification, Product-of-sum simplification, Don't care conditions, Combinational Circuits, Half Adder, Full Adder, Flip-Flops, Sequential Circuits.

(8L)

Module II:
Digital Components: Integrated Circuits, Decoders, NAND Gate Decoder, Encoders, Multiplexers, Registers, Register with parallel load, Shift Registers, Bidirectional Shift register with parallel load, Binary Counters, Binary counter with parallel load, Memory Unit, RAM, ROM, Types of ROMs.
Data Representation: Data Types, Number System, Complements, Subtraction of Unsigned Numbers, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes, Other Decimal Codes, Error Detection Codes

(8L)

Module III:
Register Transfer and Micro-operations: Register Transfer language, RegisterTransfer Bus and Memory Transfers, Three-State Bus Buffers, MemoryTransfer, Arithmetic Micro-operations, BinaryAdder, Binary Adder-Subtractor, Binaryincrementer, Arithmetic Circuit Logic, Micro-operations, Shift Micro-operations, HardwareImplementation, Arithmetic Logic Shift Unit.

(8L)

Module IV:
Central Processing Unit: Introduction, General Register Organization, Stack Organization, Register Stack, MemoryStack, Reverse Polish Notation, Evaluation of Arithmetic Expressions, InstructionFormats, AddressingModes, Data Transfer and Manipulation, ProgramControl, ProgramInterrupt, Types of Interrupts, Reduced Instruction Set Computer (RISC).

(8L)

Module V:
Memory Organization: Memory Hierarchy, Main Memory, RAM and ROM Chips, Memory Address Map, Memory Connection to CPU, Auxiliary Memory, Magnetic Disks and Tape, Associative Memory, Hardware Organization, March Logic, Read/Write Operation, Cache Memory, Associative Mapping, Direct Mapping, Set-Associative Mapping, Virtual Memory, Address Space and Memory Space, Address Mapping Using Pages, Associative Memory Page Table, Page Replacement, Memory Management Hardware.

Books recommended:

TEXT BOOK
1. Mano M., "Computer System Architecture", Prentice Hall of India, New Delhi, 1995.**(T1)**

REFERENCE BOOK
1. Morris Mano M & Ciletti M.D., "Digital Design", 4th Edition, PHI, 2008.**(R1)**
2. Hayes, J.P., "Computer Architecture and Organization", 3rdEdition, McGraw-Hill,

London, 2000.**(R2)**

3. Ram. B., "Computer Fundamentals: Architecture and Organization", 3rdEdition, New Age International Publication, New Delhi, 2000.**(R3)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	2	1	2	1	2	1
CO2	3	2	1	1	1	2	2	1
CO3	3	3	2	1	1	2	1	1
CO4	2	3	2	2	1	2	2	2
CO5	3	2	2	1	1	1	1	1

< 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,CD6,CD7
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD3,CD4,CD5,CD7

COURSE INFORMATION SHEET

Course code: MT123
Course title: BUSINESS COMMUNICATIONS
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L: 2   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

1.	Analyze and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation.
2.	Understand the importance of specifying audience and purpose and to select appropriate communication choices.
3.	Interpret and appropriately apply modes of expression, i.e., descriptive, expositive, Narrative, scientific, and self-expressive, in written, visual, and oral communication
4.	Participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding.
5.	Develop the ability to research and write a documented paper and/or to give an oral presentation.

Course Outcomes
After the completion of this course, students will be able to:

CO1	Apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
CO2	Utilize analytical and problem-solving skills appropriate to business communication.
CO3	Participate in team activities that lead to the development of collaborative work skills.
CO4	Select appropriate organizational formats and channels used in developing and presenting business messages
CO5	Communicate via electronic mail, Internet, and other technologies and deliver an effective oral business presentation.

SYLLABUS

Module I:
Introduction to Business Communication:
Importance and Objectives of Business communication, Process of communication, Barriers to effective communication, Techniques of effective communication. Forms of communication (Written, Oral, audio-visual communication).

(8L)

Module II:
Managing Business Communication:
Formal and Informal communication, Non- verbal communication (Body language, Gestures, Postures, Facial expressions). The cross-cultural dimensions of business communication. Techniques to effective listening, methods and styles of reading.

(8L)

Module III:
Other aspects of communication:
Vocabulary:
Single word substitution, Idioms and phrases, Precis writing, Comprehension.
Group Discussions, Extempore, Principles of effective speech and presentations, Role-playing.

(8L)

Module IV:
Introduction to managerial writing:
Business letters: Inquiries, Circulars, Quotations, Orders, Acknowledgement, Claims & adjustments, Collection letters, Sales letters, Drafting of different resumes, Covering letters Applying for a job, Social correspondence, Invitation to speak.
Official Correspondence: Memorandum, Notice, Agenda, Minutes, Circular letters.

(8L)

Module V:
Report writing and Technical Proposals:
Business reports, Types, Characteristics, Importance, Elements of structure, Process of writing, Order of writing, the final draft, checklists for reports.
Technical proposals, Definitions, types and format.

(8L)

Books recommended:

TEXT BOOK
1. "Communication Skills", Sanjay Kumar &PushpLata, Oxford University Press. **(T1)**
2. "Business Correspondence and Report Writing",R.C.Sharma, Krishna Mohan, McGraw Hill. **(T2)**
3. "Communication for Business",Shirley Taylor, V.Chandra, Pearson. **(T3)**

REFERENCE BOOK
1. "Business Communication", HorySankar Mukherjee, Oxford University Press. **(R1)**
2. "Basic Business Communication", Lesikar I Flatley, McGraw Hill.**(R2)**
3. "Business Communication Today",Bovee, Thill and Chaterjee, Pearson. **(R3)**

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COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	1	2	2	1	2
CO2	2	2	1	3	2	2	2	1
CO3	3	2	3	3	2	1	2	2
CO4	3	2	2	3	1	1	3	1
CO5	3	1	1	1	3	3	2	1

< 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1,CD2,CD3
CD2	Tutorials/Assignments	CO2	CD1,CD2,CD3
CD3	Seminars	CO3	CD1,CD2,CD3
CD4	Mini projects/Projects	CO4	CD1,CD2,CD3,CO4 CD5
CD5	Laboratory experiments/teaching aids	CO5	CD1,CD2,CO5
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

COURSE INFORMATION SHEET

Course code: CE101
Course title: ENVIRONMENTAL SCIENCE
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L: 2   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students:

1.	To develop basic knowledge of ecological principles and their applications in environment.
2.	To identify the structure and composition of the spheres of the earth, the only planet sustaining life.
3.	To analyse, how the environment is getting contaminated and probable control mechanisms for them.
4.	To generate awareness and become a sensitive citizen towards the changing environment.

Course Outcomes

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

CO1	Explain the structure and function of ecosystems and their importance in the holistic environment.
CO2	Identify the sources, causes, impacts and control of air pollution.
CO3	Distinguish the various types of water pollution happening in the environment and understand about their effects and potential control mechanisms.
CO4	Judge the importance of soil, causes of contamination and need of solid waste management.
CO5	Predict the sources of radiation hazards and pros and cons of noise pollution.

SYLLABUS

Module I:
Ecosystem and Environment
Concepts of Ecology and Environmental science, ecosystem: structure, function and services, Biogeochemical cycles, energy and nutrient flow, ecosystem management, fate of environmental pollutants, environmental status and reports on climate change.

(8L)

Module II:
Air Pollution
Structure and composition of unpolluted atmosphere, classification of air pollution sources, types of air pollutants, effects of air pollution, monitoring of air pollution, control methods and equipment for air pollution control, vehicular emissions and control, indoor air pollution, air pollution episodes and case studies.

(8L)

Module III:
Water Pollution
Water Resource; Water Pollution: types and Sources of Pollutants; effects of water pollution; Water quality monitoring, various water quality indices, water and waste water treatment: primary, secondary and tertiary treatment, advanced treatments (nitrate and phosphate removal); Sludge treatment and disposal.

(8L)

Module IV:
Soil Pollution and Solid Waste Management
Lithosphere – composition, soil properties, soil pollution, ecological & health effects, Municipal solid waste management – classification of solid wastes, MSW characteristics, collection, storage, transport and disposal methods, sanitary landfills, technologies for processing of MSW: incineration, composing, pyrolysis.

(8L)

Module V:
Noise pollution & Radioactive pollution
Noise pollution: introduction, sources: Point, line and area sources; outdoor and indoor noise propagation, Effects of noise on health, criteria noise standards and limit values, Noise measurement techniques and analysis, prevention of noise pollution; Radioactive pollution: introduction, sources, classification, health and safety aspects, Hazards associated with nuclear reactors and disposal of spent fuel rods-safe guards from exposure to radiations, international regulation, Management of radioactive wastes.

(8L)

Books recommended

TEXT BOOK
1. A, K. De., "Environmental Chemistry", New Age Publications India Ltd., 3rd Edition, 2008.**(T1)**
2. R. Rajagopalan,"Environmental Studies: From Crisis to Future", 3rd Edition, Oxford University Press, 2016.**(T2)**
3. Eugene P. Odum., "Fundamentals of Ecology", 3rd Edition, WB Sunders Company, Philadelphia, 1971.**(T3)**

4. C. N. Sawyer, P. L. McCarty and G. F. Parkin, "Chemistry for Environmental Engineering and Science", John Henry Press, 2002.**(T4)**
5. S.C. Santra,"Environmental Science", New Central Book Agency, 2011. **(T5)**

REFERENCE BOOK
1. D.W. Conell,"Basic Concepts of Environmental Chemistry", CRC Press.**(R1)**
2. Peavy, H.S, Rowe, D.R, Tchobanoglous, G.,"Environmental Engineering", Mc-Graw - Hill International. **(R2)**
3. G.M. Masters & Wendell Ela,"Introduction to Environmental Engineering and Science", PHI Publishers, 1991.**(R3)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	1	2	2	2	1
CO2	3	2	3	3	3	3	2	1
CO3	3	2	1	1	2	2	1	1
CO4	3	1	2	3	1	2	3	1
CO5	1	1	1	1	3	1	2	1

< 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1, CD2
CD2	Tutorials/Assignments	CO2	CD1, CD2
CD3	Seminars	CO3	CD1, CD2
CD4	Mini projects/Projects	CO4	CD1, CD2
CD5	Laboratory experiments/teaching aids	CO5	CD1, CD2
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

COURSE INFORMATION SHEET

Course code: CA104
Course title: MATHEMATICS-I (ELEMENTARY MATHEMATICS)
Pre-requisite(s):
Co- requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

1.	Get an understanding about set and relations.
2.	Demonstrate a depth of understanding of functions and binary operations.
3.	Gain an understanding of Abstract Algebra and Matrices.
4.	Get a brief idea about the principles of Differential Calculus and Differential Equations.
5.	Be able to solve differential equations and differential calculus problems.

Course Outcomes
After the completion of this course, students will be able to:

CO1	Decide the behaviour of set and relations in the field of computer science.
CO2	Apply the concepts of functions and binary operations in various computer programs.
CO3	By using the properties of Algebra and Matrices to decide the behaviour different problems
CO4	Apply the principles of Differential Calculus and Differential Equations to solve a variety of scientific problems in engineering and sciences.
CO5	Enhance and develop the ability of using the language of mathematics in engineering.

SYLLABUS

Module I:
Sets and Relations: Sets and their representations, The empty set, Finite and Infinite set, Equal and equivalent set, Subset; powerset; Universalset; Venndiagrams; Operations on sets; Complement of a set; Cartesian product, Relation, Inverse Relation, Composition of relation, Equivalence of relations and Classes.

(8L)

Module II:
Functions and Binary Operations: Functions as a set, Representation of function, Types of Functions, Functions applicable in Computer Science: Integer function, Factorial function, Absolute, Characteristic, Floor, Ceiling, Remainder, Boolean, Exponential, Logarithmic, Hashing functions and Binary operation on a set.

(8L)

Module III:
Abstract Algebra: Group, Subgroup, Order of group, cyclic group and Simple theorems, Ring, Integral domain, Field and Simple theorem related to Integral domain and field.

(8L)

Module IV:
Matrices Algebra: Definition of matrix, Operations on matrices, Square matrix and its inverse, Inverse of a matrix by Row operation, Rank of matrix by Echelon form, Solution of a System of Linear Simultaneous equation by matrix method, Eigen value and Eigen vector, Caley Hamilton theorem (without proof), to find the inverse of a non-singular matrix using Caley-Hamilton theorem.

(8L)

Module V:
Differential Calculus: Successive differentiation, Leibnitz Theorem, Partial derivative, Partial derivative of Higher orders, Homogeneous function, Euler's Theorem on Homogeneous functions.
Differential equation: Definition of Differential equation, Order and degree of a differential equation, Linear differential equation and Equation of Higher Order Linear differential equation with constant coefficients, Partial differential equations, Order and degree of partial differential equation, Lagrange's Linear Equations, Linear Homogeneous partial differential equation.

(8L)

Books recommended:

TEXT BOOK
1. Vasishtha A.R., "Modern Algebra", Krishna Prakashan Media (P) Ltd, Meerut, 2006.**(T1)**
2. Vasishtha A.R, "Matrices", Krishna Prakashan Media (P) Ltd, Meerut, 2006. **(T2)**
3. DasH.K., "Advanced Engineering Mathematics", S. Chand, 2009.**(T3)**

REFERENCE BOOK
1. KolmanB., BusbyR. C., and RossS. C., "Discrete Mathematical Structures", 6th Edition, Prentice Hall of India, 2008.**(R1)**

2. ShethH., "Abstract Algebra", PHI, 2009.**(R2)**
3. GrewalB. S., "Higher Engineering Mathematics", Khanna Publishers, 2000.**(R3)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	2	1	2	2	2
CO2	3	3	1	2	1	2	2	2
CO3	3	3	2	2	1	2	2	2
CO4	3	3	3	3	1	2	2	2
CO5	2	3	3	2	2	2	3	2

$< 34\% = 1$, $34-66\% = 2$, $> 66\% = 3$

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,CD6,CD7
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD3,CD4,CD5,CD7

COURSE INFORMATION SHEET

Course code: CA102
Course title: PROBLEM SOLVING AND PROGRAMMING IN C LAB
Pre-requisite(s):
Co- requisite(s): Problem Solving and Programming in C
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students:

1.	To learn computer language.
2.	To Learn coding for problems.
3.	To learn the problem-solving process through computer.
4.	To know the limitations of system during program execution.
5.	To know the practical application of various programming techniques.

Course Outcomes

After the completion of this course, students will be able:

CO1	To formulate simple algorithms for arithmetic and logical problems.
CO2	To translate the algorithms to programs.
CO3	To test and execute the programs and correct syntax and logical errors.
CO4	To apply programming to solve simple numerical method problems, differentiation of function and simple integration.
CO5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

SYLLABUS

List of Programs as Assignments:

1. Write an interactive program that will read in a +ve integer value and determine the following

    i) If the integer is a prime number   ii) If the integer is a Fibonacci number

2. WAP in C to compute $\sin x = x - x^3/3! + x^5/3! - x^7/7! \ldots$ Continue adding successive terms in the series until the value of the next term becomes smaller (in magnitude) than 10^{-5}. Test the program for $x = 1$, $x = 2$, and $x = 3$. In each case display the number of terms used to obtain the final answer.

3. WAP to generate every 3rd integer beginning with I = 2 and continue for all integers that are less than 150. Calculate the sum of those integers that are evenly divisible by 5.

4. WAP to find whether a given year is a leap year or not. Modify it to generate a list of leap years between two year limits given by user.

5. WAP to display the following pattern:

```
                        11

                11      10      11

        11      10      9       10      11

11      10      9       8       9       10      11
```

6. Using Ternary / Conditional operator find the greatest among 3 numbers.

7. WAP to convert a decimal number into an equivalent number of the input base. Test your program for base 2,8,10 & 16.

8. WAP to read a number n, and print it out digit-by-digit, as a series of words. For e.g. 123 would be printed as "one two three".

9. WAP to check whether any input +ve integer is palindrome or not.

10. WAP to simulate a simple calculator (+ - / * %) that takes two operands and an operator as input and displays the result.

11. WAP to find the GCD of two input +ve integer numbers.

12. WAP to swap the values of two variables without using a third variable.

13. Read a line of mixed text, and then write it out with all lower case and uppercase letters reversed, all digits replaced by 0s and all other characters (non-letters and non-digits) replaced by '*'.

14. WAP to find the product of two matrices A and B. Display the source matrices and product matrix C in matrix format.

15. WAP to find whether a given matrix is a triangular matrix or not.

16. WAP to find the transpose of a matrix. Display the source and the transposed matrix in matrix format.
17. Implement Prob. No. – 14 to 16 using functions for reading, manipulating and displaying the corresponding matrices in matrix form.
18. WAP to sort a list of strings alphabetically using a 2-dim. Character array.
19. WAP to display the row sum and the column – sum of an input 2- dim. Matrix. Display the source matrix with row and column sum.
20. Write a recursive function to calculate S = 2 + 4 + 6 + 8 + …… +2N. Implement the function in a complete C program.
21. Write a function that accepts two arguments an array and its size n. It performs Bubble up sort on the array elements. Using indirection operator '*' implement this in a complete C program. Display the source and the sorted array.
22. Using pointer, write a function that receives a character string and a character as argument. Delete all occurrences of this character in the string. The function should return corrected string with no holes.
23. Write a function for reading character string using pointer. Calculate the length of the string (without using strlen ()). Finally print the string in reverse order, using pointer.
24. Implement prob. No. 14 using pointers representation of 2 – dim. array.
25. Implement prob. No. 15 using pointer representation of 2 dim. array.
26. Implement prob. No. 16 using pointer representation of 2 dim. array.
27. WAP to sort a list of strings into alphabetical order using array of pointers.
28. Create records of 60 students, where each record has fields-name, roll, gpa and fees. Write a function update () to reduce the fees of those students who have obtained gpa greater than 8.5 by 25% of the original fees. Write a complete program to exercise this function in the main program and display all the records before and after updation.
29. Define a structure that describes a hotel. It should have members that include the name, address, grade, average room charge and number of rooms. Write a function to perform the following operations:
    a) To print out hotels of a given grade in order of charges.
    b) To print out hotels with room charges less than a given value.
30. WAP to concatenate the contents of two files into a third file.
31. WAP to copy the content of one file into another file. Names of both the files are to be input as command line arguments

Books recommended:

TEXT BOOK
1. Jery R Hanly, "Problem solving and Program design in C", Paerson Education, 7th Edition. **(T1)**
2. Byron Gottfried, "Schaum's Outline of Programming with C", McGraw-Hill. **(T2)**
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill. **(T3)**
4. R.G.Dromey, How to Solve it by Computer, Pearson Education. **(T4)**

REFERENCE BOOK

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Prentice Hall India Learning Private Limited.**(R1)**

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	2	1	2	1
CO2	3	3	3	3	2	1	2	2
CO3	3	3	3	3	2	1	2	1
CO4	3	3	3	3	1	1	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: 180
Course title: OFFICE AUTOMATION TOOLS
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students:

1.	To learn automation tools
2.	To understand the basic of basic technology
3.	To learn the problem-solving process through computer.
4.	To know the limitations of automation
5.	To know the practical application of various automation tools

Course Outcomes

After the completion of this course, students will be able:

CO1	To solve real time problems using automation tools
CO2	To translate the real time problem into automation problem
CO3	To analyse the basic application of automation tools.
CO4	To apply different tools for different automation problems
CO5	To decompose a real-time problem into a small automation problems.

SYLLABUS

ModuleI:
COMPUTER SCIENCE & OPERATING SYSTEMS (WINDOWS/LINUX)
1. **Types of Computer:** Analog, Digital, and Hybrid type, Hardware, Software, System software, Application software, Stored Program Concept and Von Newman Architecture, Firm ware, Human ware, Stored Program Concept, Evolution of computers, Generation of computer.
2. **Data Processing:** Data collection, Classifications, Sorting and Merging, Processing, Summarizing Storing.
3. **Data Organisation:** Organization Data, Character, Field, Record, File, Database, Sequential Access, Random Access, Indexed Sequential Access.
4. **Data Communication:** Local Area Network, Wide Area Network, Satellite Communication, Internet.
5. **Operating System:** Introduction, Different Operating Systems, Loading and Quitting the Operating Systems Important DOS/Windows/Linux Commands.

(8L)

Module II:
WINDOWS/Linux
1. Windows Introduction,
2. Concepts different Operating System GUI/CUI.
3. Desktop Icons. (Windows / Desktop Linux)
4. My Computer, Recycle Bin, Internet Explorer, Network Neighbourhood, My Documents
5. Working with windows: How to create a Folder, Copying and cutting files, Renaming
6. Programs, Favourites, Documents, Settings, Find, Run, Shut down
7. APPLICATION ICONS
8. Introduction to Output Devices

(8L)

ModuleIII:
PERSONAL COMPUTER SOFTWARE TOOLS (MS WORD, EXCEL AND POWERPOINT)/
1. Open Office Word Processing using MS WORD: An introduction to MS-Word / ON INTRODUCTION TO WORD/Writer.
2. The Word work space, Starting and quitting word, Creating and Manipulating Various documents, Editing of proofing files, Merging documents and macros.
3. How to use Mouse and Menu, Working with dialog box
4. Primary Command in File Menu: The Open Commands, The File name commands, The New commands, The Save, Save As, and Save all commands, The Close command, The Page setup, The Print commands, The Exit commands
5. Edit Menu commands: The Cut, Copy, and Paste commands, The Undo and Repeat commands
6. Format commands: Font commands, Paragraph commands
7. Other Menu: The view menu, The Insert menu, The tool menu, The table menu, The Window menu

(8L)

Module IV:
EXCEL
1. BUILDING A SIMPLE WORKSHEET
2. Entering Text, Entering Values, Entering Dates and Times, Moving Around, Selecting Ranges, Using Menu, Using
3. Tool Bar, Using Shortcut Menus, Changing Entries, Copying Entries, Moving Entries, Inserting and Deleting cells
4. FORMATTING BASICS
5. Changing Character Style, Changing Alignment, Changing Column Width
6. WORKING WITH MULTIPLE WORKSHEET
7. Copying entries between work books, Moving sheets between work books, Deleting sheets, Quitting Excel
8. OPENING EXISTING WORKBOOKS
9. Simple calculations, Doing Arithmetic, Totalling column of values, Naming cells and Ranges
10. FORMATTING TEXT
11. Displaying dollars and cents, Formatting decimal places, dates Format, Copying style and formats
12. FORMULAS THAT MAKE DECISIONS
13. Using the IF function, Using the nested IF function, Copying formulas
14. Checking Spelling, Printing Worksheets, Preview Worksheets, Setting up the pages,
15. Sorting data, Keeping Leading in View, Finding records, Adding and deleting Records, Filtering Records
16. Plotting charts, Sizing and moving charts, Updating charts, changing the chart type, Using chart auto format
17. Creating Macros, Recording Macros, Running Macros

(8L)

Module V:
POWER POINT
1. Main Features of Power Point
2. MAKING THE PRESENTATION
3. Creating Template with the Auto Content Wizard. Creating a Presentation with a Template. Creating a presentation from Scratch
4. DIFFERENT VIEWS
5. Normal Slide, Outline, Slide Sorter, Slide Show, Notes, Slide Master
6. ANIMATION, ART AND SOUND
7. Controlling Transitions between slides. Animating Different Parts of a slide. Inserting a Motion Clip. Including
8. Sounds in slides.
9. INCLUDING GRAPHS, CHARTS, TABLES AND COLUMNS
10. Organization Chart Slide, Creating a table Slide. Creating two column Slide, Module 1: Showing A Presentation,
11. Rehearsing/ Timing a Presentation, Designation some slides as "Hidden", Viewing Slides Anywhere in a Slide Show.
12. Techniques for Making a Show Livelier
13. OFFICE CONNECTIONS
14. Presenting with the help of other Office Programs Importing the text from a World Document.
15. Printing a Presentation

(8L)

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
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CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	2	1	2	2
CO2	3	1	1	1	1	1	2	1
CO3	2	3	3	3	2	1	2	1
CO4	3	3	3	3	1	1	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA155
Course title: DATA STRUCTURES
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s): DS Lab
Credits: 4   L:3   T:1   P:0
Class schedule per week: 04
Class: BCA
Semester / Level: II/1
Branch: BCA

Course Objectives

This course enables the students:

A.	To know details about the data structure.
B.	Applications, advantages and limitations of various data structures.
C.	Real life use of various data structures.
D.	Implementations of various data structures.
E.	Analyse and compare the different algorithms

Course Outcomes

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

1.	Understand the properties of various data structures
2.	Identify the strength and weaknesses of different data structures
3.	Design and employ appropriate data structures for solving computing problems
4.	Analyze and compare the efficiency of algorithms
5.	Solve computing problems independently

SYLLABUS

Module I:
Algorithms and Analysis of Algorithms: Definition, Structure and Properties of Algorithms, Development of an Algorithm, Data Structures and Algorithms, Data Structure – Definition and Classification, Efficiency of Algorithms, Asymptotic Notations, Polynomial Vs Exponential Algorithms, Average, Best and Worst case Complexities, Open source software development process.

(8L)

Module II:]
Arrays, Stacks and Queues: Array Operations, Number of Elements in an Array, Representation of Arrays in Memory, Applications of Array, Stack-Introduction, Stack Operations, Applications of Stack, Queues-Introduction, Operations on Queues, Circular Queues, Other Types of Queues, Applications of Queues.

(8L)

Module III:
Linked List, Linked Stacks and Linked Queues: Singly Linked Lists, Circularly Linked Lists, Doubly Linked Lists, Applications of Linked Lists, Introduction to Linked Stack and Linked Queues, Operations on Linked Stacks and Linked Queues, Implementations of Linked Representations, Applications of Linked Stacks and Linked Queues.

(8L)

Module IV:
Trees, Binary Trees, BST, AVL Trees and B Trees: Trees: Definition and Basic Terminologies, Representation of Trees, Binary Trees: Basic Terminologies and Types, Representation of Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Applications. Introduction, BST: Definition and Operations, AVL Trees: AVL Definition and Operations, B Trees: Introduction, m-way search trees: Definition and Operations.

Module V:
Sorting and searching: Introduction, Radix sort, Shell Sort, Quick Sort, Heap Sort. Searching: Introduction, Binary Search, Transpose Sequential Search, Interpolation Search.

(8L)

TEXT BOOKS
1. BalujaG S, "Data Structure through C", Ganpat Rai Publication, New Delhi, 2015.
2. PaiG A V, "Data Structures and Algorithms: Concepts, Techniques and Applications", 2nd Edn, Tata McGraw-Hill, 2008.
3. Horowitz E., Sahni S., Susan A., "Fundamentals of Data Structures in C", 2nd Edition, University Press, 2010.

REFERENCE BOOKS
1. TremblayJ. P., SorensonP. G, "An Introduction to Data Structures with Applications", 2nd Edn, McGraw-Hill, Inc. New York, NY, USA.
2. Lipschutz Seymour, "Data Structures", 6th Edn, 9th Reprint 2008, Tata McGraw-Hill.
3. Drozdek Adam, "Data Structures and Algorithms in C++", Thomson Learning, New Delhi – 2007.
4. FellerJ., FitzgeraldB., "Understanding Open Source Software Development", Pearson Education Ltd. New Delhi

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	2	1	2	2
CO2	3	1	1	1	1	1	2	1
CO3	2	3	3	3	2	1	2	1
CO4	3	3	3	3	1	1	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA157
Course title: DISCRETE STRUCTURES
Pre-requisite(s):
Co- requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: BCA

Course Objectives

This course enables the students to:

A.	Use appropriate set, function, or relation models to analyse practical examples, interpret the associated operations and terminology in context.
B.	Determine number of logical possibilities and probability of events.
C.	Learn logic and proof techniques to expand mathematical maturity.
D.	Formulate problems precisely and explain their reasoning clearly.
E.	Solve the problems, apply formal proof techniques

Course Outcomes

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

1.	To formulate problems precisely
2.	Solve the problems, apply formal proof techniques, and explain their reasoning clearly.
3.	Illustrate by example, basic terminology and model problems in computer engineering using graphs and trees
4.	Analyse problems precisely and explain their reasoning clearly.
5.	Solve the problems, apply formal proof techniques

SYLLABUS

Module I:
Sets and Propositions: Sets, Operations of sets, Finite and Infinite sets, Principle of inclusion and exclusion, Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and Existential Quantifiers, Normal forms, Mathematical Induction.

(8L)

Module II:
Relations and Functions: Relations, Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence relations. Functions, Types of functions, Composition of functions, Invertible functions.Permutations and Combinations, Pigeonhole Principle, Recurrence Relation.

(8L)

Module III:
Partially Ordered Sets: Introduction, Elements of Partially Ordered Sets, Lattices.

(8L)

Module IV:
Graph Theory and Trees: Basic terminology, representation of a graph in computer memory, Relations and Digraphs, Paths in Relations and Digraphs, Shortest path in weighted graphs (Dijkstra's algorithm). Basic terminology and characterization of trees, Tree traversal, Spanning trees, Minimal Spanning trees(Introduction).

(8L)

Module V:
Groups, Rings and Fields: Groups, Semi Groups, Monoids, Subgroups, Isomorphism and Homomorphism and Normal Subgroups, Rings, Integral Domain, Rings Homomorphism, Polynomial Rings, Fields.

(8L)

TEXT BOOKS
1. KolmanB., BusbyR. and RossS., "Discrete Mathematical Structures", 6th Edition, PearsonEducation, 2002, ISBN 81-7808-556-9.
2. DeoN., "Graph Theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0 – 87692 – 145 – 4.
3. JohnsonbaughR., "Discrete Mathematics", 5th Edition, Pearson Education, 2001 ISBN 81 – 7808 – 279 – 9.

REFERENCE BOOKS
1. BiggsN., "Discrete Mathematics", 3rd Edition, Oxford University Press, ISBN 0 –19 – 850717 – 8.
2. RosenKenneth H., "Discrete Mathematics and its Applications", 6th edition, McGraw-Hill, 2007, ISBN 978-0-07-288008-3.
3. LipschutzSemyour & Lipson Marc, "Discrete Mathematics", McGraw-Hill, 3rd Special Indian Edition, ISBN-13: 978-0-07-060174-1.
4. LiuC. L. and MohapatraD. P., "Elements of Discrete Mathematics", SiE Edition, Tata McGraw-Hill, 2008, ISBN 10:0-07-066913-9.
5. LipschutzS. and LipsonM., Schaum's Outline of Discrete Mathematics, Revised Third Edition, Tata McGraw Hill, 2010.
6. MottJ. L., KandelA. and BakerT. P., Discrete Mathematics for Computer Scientists and Mathematicians, 2nd Edition, Prentice Hall of India, 2001

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
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Semester End Examination	50

Continuous Internal Assessment	% Distribution
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Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

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CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	2	1	2	2
CO2	3	1	1	1	1	1	2	1
CO3	1	3	3	1	2	3	2	1
CO4	3	3	1	1	1	1	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course Code: CA160
Course Title: OPERATING SYSTEM CONCEPTS
Pre-requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: BCA
Type: Lecture and Tutorial

Course Objectives
This course enables the students to:

A.	Present the main components of OS and their working
B.	Introduce the concepts of process and thread and their scheduling policies
C.	Handling synchronization of concurrent processes and deadlocks
D.	Analyze the different techniques for managing memory, I/O, disk and files
E.	Design the components of operating system

Course Outcomes:
After the completion of this course students will be able to :

1.	Understand the general architecture of computer system.
2.	Understand, contrast and compare differing structures for operating systems
3.	Gain proficiency needed to analyse theory and implementation of: processes, scheduling, I/O and files systems.
4.	Be familiar with various types of operating systems including Unix /Linux
5.	Get in-depth knowledge of memory management for operating systems

SYLLABUS

Module I:
Introduction & System Structures: What Operating Systems do, Computer System Organisation, Computer System Architecture: Single Processor Systems, Multiprocessor Systems, Clustered Systems, Operating System Structure, Operating System Operations, Distributed Systems, Special Purpose Systems, Computing Environments, Open-Source Operating Systems, Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation: Design Goals, Mechanisms and Policies, Implementation, Operating System Structure: Simple Structure, Layered Approach, System Boot.

(8L)

Module II:
Process Management: Process Concept, Operations on Processes, Process Scheduling- Basic Concepts, Scheduling Queues, Schedulers, Pre-emptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Algorithms.

(8L)

Module III:
Deadlock Handling: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

(8L)

Module IV:
Memory Management: Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.
File Management: File Concept, Access Methods, Directory & Disk Structure, File System Mounting, File Sharing, Protection, File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management.

(8L)

Module V:
Secondary Memory Management: Overview of Mass Storage Structures, Disk Structure, Disk Scheduling, Disk Management.
Case Study- The Linux System: Linux History, Design Principles, Kernel Modules, Process Management, Scheduling (except Symmetric Multiprocessing), Memory Management (except Virtual Memory), File Systems, Input & Output.

TEXT BOOK
1. SilberschatzA., GalvinP.B. & GagneG., "Operating System Concepts", 8th Edition, Wiley India, 2012.

REFERENCE BOOKS
1. DeitelH.M., "Operating Systems", 3rd Edition, Prentice-Hall of India, 2006.
2. TanenbaumA.S., "Modern Operating Systems", 2nd Edition, Prentice-Hall of India, 2010.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
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CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA158
Course title: NUMERICAL AND STATISTICAL METHODS
Pre-requisite(s): Programming knowledge and High-level Mathematics
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: BCA
Name of Teacher:

Course Objectives
This course enables the students to:

A.	Able to map a problem in the computer domain so that with the help of computer it can be Solved.
B.	To develop skill to represent and solve a problem in Computer
C.	Able to understand the basic of computing methodologies that done with computers.
D.	To develop understanding of basic of computation methodologies
E.	Understating the functionality of Abstract machines with their limitations

Course Outcomes
After the completion of this course, students will be able to:

1.	Identify problems in the computer domain.
2.	Explain the basic of computing methodologies that done with computers
3.	Evaluate basic computation methodologies
4.	Analyse functionality of Abstract machines with their limitations
5.	Apply computing methodologies that are done with computers.

SYLLABUS

Module I:
Errors in Numerical Methods: Concept of Exact and Approximate Numbers, Significant Figures, Rounding off rules, Absolute, Relative and Percentage Errors, General Error Formula.
Solution of Algebraic and Transcendental Equations: Basic Concepts, Geometrical Interpretation (if any), Condition for Convergence, Rate of Convergence, Bisection Method, Method of False Position or Regula-Falsi Method, Method of Iteration, Newton Raphson Method.

(8L)

Module II:
Interpolation : Finite Differences, Forward Difference Operator, Backward Difference Operator, Central Difference Operator, Shift Operator – Properties of the Operators, Relation among the Operators, Differences of a Polynomial, Newton's Forward and Backward Difference Interpolation Formulae, Gauss' Central Difference Interpolation Formulae, Lagrange's Interpolation, Divided Differences and their properties, Newton's general interpolation formula with divided difference, Inverse interpolation using Lagrange's interpolation formula.

(8L)

Module III:
System of Linear Algebraic Equations: Matrix Inversion Method, Gauss Elimination Method, Gauss Jordan Method, LU Decomposition Method, Gauss-Jacobi Method, Gauss –Seidel Method.
Numerical Differentiation and Integration: Numerical Differentiation, Numerical Integration, Derivation of General Quadrature Formula., Trapizoidal Rule, Simpson's 1/3- Rule, Simpson's 3/8-Rule.
Numerical Solution of Ordinary Differential Equations: Solution by Taylor's Series, Euler's Method, Modified Euler's Method, Runge-Kutta Methods (2nd order)

(8L)

Module IV:
Concepts of Probability: Experiment and Sample Space, Events and Operations with Events, Probability of an Event, Basic Probability Rules, Applications of Probability Rules, Conditional Probability.
Random Variables: How Random Variable Arise, Probability Distribution of a Random Variable, Mean or Expected Value of a Random Variable, Probability Histogram Value of a Random Variable, Variance and Standard Deviation of a Random Variable.
Binomial Experiments: Structure of a Binomial Experiment, Binomial Probability Distribution, Use of Binomial Probability Table.
Normal Curve and Normal Distribution: Motivation behind a Normal Curve, Properties of a Normal Curve, Normal Probability Distribution, Areas Under a Normal Curve.

(8L)

Module V:
Estimation of Population Parameters: Parameter and Statistic, Point and Interval Estimation, Interval Estimation of Three Common Parameters.
Bivariate Quantitative Data- Correlation and Regression: Concepts of a Bivariate Data Set, Correlation Coefficient, Inferences on a Population Correlation Coefficient, The Regression line, Inferences on the Population Regression Line.

(8L)

TEXT BOOKS
1. SastryS.S., "Introductory Methods of Numerical Analysis", PHI, Private Ltd., New Delhi.
2. PalN. & SarkarS., "Statistics: Concepts and Applications", PHI, New Delhi, 2005.

REFERENCE BOOKS

1. HoggR.V. et.al, "Probability and Statistical Inpane", 7th Edn, Pearson Education, New Delhi, 2006.
2. BurdenR.L. & FairesJ.D., "Numerical Analysis", Thomson Learning-Brooks/Cole, IndianReprint, 2005.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
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CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	2	3	2	2	1
CO2	1	2	1	2	1	1	2	1
CO3	2	3	3	3	2	1	2	1
CO4	3	3	3	3	1	2	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA156
Course title: DATA STRUCTURES LAB
Pre-requisite(s): C/C++; Knowledge of programming languages
Co- requisite(s): DS Lab
Credits: 2   L:0   T:0   P: 2
Class schedule per week: 04
Class: Bachelor of Computer Applications
Semester / Level: II/1
Branch: BCA

Course Objectives

This course enables the students:

A.	To assess how the choice of data structures and algorithm design methods impact the performance of programs.
B.	To choose the appropriate data structure and algorithm design method for a specified application.
C.	To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, binary search trees, and graphs and writing programs for these solutions.
D.	Analyse and compare the different algorithms

Course Outcomes

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

1.	Be able to design and analyze the time and space efficiency of the data structure
2.	Analyze run-time execution of previous learned sorting methods, including selection, merge sort, heap sort and Quick sort
3.	Have practical knowledge on the applications of data structures
4.	Be capable to identity the appropriate data structure for given problem

SYLLABUS

1. Program to Find the Number of Elements in an Array
2. Develop and Implement a menu driven program in C for the following Array operations
   a. Creating Array of N Integer elements.
   b. Display of Array elements with suitable headings.
   c. Inserting an element (ELEM) at a given valid position (POS).
   d. Deleting an element at a given valid position (POS).
   e. Exit
3. Programs for Stack, Queues and Circular Queues using Arrays
4. Program to convert an Infix Expression into Postfix and Postfix Evaluation
5. Program to implement stack using arrays
6. Program to implement stack using linked list
7. Program to implement multiple stack in a single array
8. Program to convert infix notation to postfix notation using stacks
9. Program to implement queue using arrays
10. Program to implement queue using pointers
11. Program to reverse elements in a queue
12. Program to implement circular queue using arrays
13. Program to create add remove & display element from single linked list
14. Program to create add remove & display element from double linked list
15. Program to count number of nodes in linear linked list
16. Program to create add remove & display element from circular linked list
17. Programs to implement stack & queues using linked representation
18. Program to concatenate two linear linked lists
19. Program to accept a singly linked list of integers & sort the list in ascending order.
20. Program to reverse linked list
21. Program to represent polynomial using linked list
22. Program to add two polynomials using linked list
23. Program for the creation of binary tree, provide insertion & deletion in c
24. Program for pre-order, post-order & in-order traversals of a binary tree using non recursive.
25. Program to count no, of leaves of binary tree
26. Program for implementation of B-tree (insertion & deletion)
27. Program for implementation of multi-way tree in c
28. Program for implementation of AVL tree
29. Program to implement bubble sort program using arrays
30. Program to implement merge sort using arrays
31. Program to implement selection sort program using arrays
32. Program to implement insertion sort program using arrays
33. Program to implement topological sort using arrays
34. Program to implement heap sort using arrays
35. Program to implement heap sort using pointers
36. Program to implement bubble sort program using pointers
37. Program to implement linear search using pointers
38. Program to implement binary search using pointers
39. Program to implement linear search using arrays
40. Program to implement binary search using arrays

TEXT BOOKS

1. Baluja G S, "Data Structure through C", Ganpat Rai Publication, New Delhi, 2015.
2. Pai G A V, "Data Structures and Algorithms: Concepts, Techniques and Applications", 2nd Edn, Tata McGraw-Hill, 2008.
3. Horowitz E., Sahni S., Susan A., "Fundamentals of Data Structures in C", 2nd Edition, University Press, 2010.

REFERENCE BOOKS

1. Tremblay J. P., Sorenson P. G, "An Introduction to Data Structures with Applications", 2nd Edn, McGraw-Hill, Inc. New York, NY, USA.
2. Lipschutz Seymour, "Data Structures", 6th Edn, 9th Reprint 2008, Tata McGraw-Hill.
3. Drozdek Adam, "Data Structures and Algorithms in C++", Thomson Learning, New Delhi – 2007.
4. Feller J., Fitzgerald B., "Understanding Open Source Software Development", Pearson Education Ltd. New Delhi

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
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Course Delivery Methods

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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	1	2	2	1	2	2
CO2	1	1	1	1	1	1	2	1
CO3	2	1	3	1	2	3	1	1
CO4	3	3	3	3	1	1	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course Code: CA161
Course Title: OPERATING SYSTEM LAB
Pre-requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: II/1
Branch: BCA
Type: Lecture and Tutorial

Course Objectives

This course enables the students to:

F.	Present the main components of OS and their working
G.	Introduce the concepts of process and thread and their scheduling policies
H.	Handling synchronization of concurrent processes and deadlocks
I.	Analyze the different techniques for managing memory, I/O, disk and files
J.	Design the components of operating system

Course Outcomes:

After the completion of this course students will be able to :

5.	Understand the general architecture of computer system.
6.	Understand, contrast and compare differing structures for operating systems
7.	Gain proficiency needed to analyse theory and implementation of: processes, scheduling, I/O and files systems.
8.	Be familiar with various types of operating systems including Unix /Linux
5.	Get in-depth knowledge of memory management for operating systems

SYLLABUS

1. Implement in C the following UNIX commands using System calls : cat and mv
2. WAP in C to Determine the size of a file using the lseek command.
3. WAP to calculate the number of blocks assigned for the file.
4. Write a C program that deletes a directory with all its subfolders. The name of the directory should be read from the command line.

5. Write a program that deletes every 5th byte from a file, but without using a temporary file or allocating a buffer in the memory.
6. WAP in C to implement FCFS CPU scheduling Algorithm.
7. WAP in C to implement SJF CPU scheduling Algorithm.
8. WAP in C to implement Priority CPU scheduling Algorithm.
9. WAP in C to implement Round Robin (RR) CPU scheduling Algorithm.
10. WAP in c to read from the buffer & produce desired output.
11. WAP ii C to create Userid & Password.
12. WAP in c to implement and find how many Users currently login in NetWork.
13. WAP in c to create your won system call just like a copy.
14. WAP in c to create your won system call just like a delete.
15. WAP in c to find the Disk Space.
16. WAP In C to find The number of pages in the process.
17. WAP In C to find The number of frames allocated to the process.
18. WAP in c to find the no. of blocks occupied by a file.
19. WAP in c to create your won system call just like a delete.
20. WAP in c to create your won system call just like a ls.
21. WAP in c to find a PID no. of any Process.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
    1. Student Feedback on Faculty
    2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
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CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA159
Course title: NUMERICAL AND STATISTICAL METHODS LAB
Pre-requisite(s): Programming knowledge and High-level Mathematics
Credits: 2   L:0   T:0   P:04
Class schedule per week: 04
Class: BCA
Semester / Level: II/1
Branch: BCA
Name of Teacher:

Course Objectives

This course enables the students to:

A.	Be able to map a problem in the computer domain so that with the help of computer it can be Solved.
B.	Learn the problem-solving process through computer.
C.	To solve problems of larger size which helps the students to understand the challenges caused by problem size.
D.	To know the rate of convergence of different methodologies.
E.	To compare among different methodologies used to solve a particular problem.
F.	To know the practical application of various programming techniques.

Course Outcomes

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

1.	Identify and suitably model a problems in the computer domain.
2.	Clearly understand different numerical methods that are used to solve problems in the domain.
3.	Understand the difficulties associated with the problems of large size.
4.	To select the most efficient (fastest) methodology to solve problems of large sizes.
5.	Identify the most suitable one among all known methodologies.

SYLLABUS

List of Programs as Assignments:

1. Write a program in C to solve the equation $x^4 + x^2 - 1 = 0$, correct to eight decimal places using bisection method.

2. Write a program in C to find the root (which lies between 2 and 3) of the following equation correct to six significant figures using bisection method.

3. Write a program in C to find the root of the equation $x^3 - 4x^2 + 10x - 10 = 0$ correct to six significant figures using Regula-Falsi Method.

4. Write a program in C to find the root (which lies between 1 and 2) of the following equation correct to six decimal places using Regula-Falsi Method and the method of Bisection. Compare the number of iterations required in both the cases:

$$2x - 3\cos x = 1.85$$

5. Write a program in C to find root of the equation $x^3 - 8x - 4$ using Newton-Raphson method correct to seven significant figures.

6. Write a program in C to solve the equation $3x - \cos x - 1 = 0$, by the method of Iteration, for the root lying between 0 and 1, correct to 6 decimal places.

7. Write a program in C to compare the rate of convergence of the Newton-Raphson method, Regula-Falsi method and the method of Bisection to find the root of the equation $2x \sin x = \cos x$ lying between 0 and 1.

8. Write a program in C to compute a difference table for the following data and hence find the value of $\Delta^p y_q$ and $\nabla^p y_q$; p and q are to be taken from the users.

X	0.30	0.32	0.34	0.36	0.38	0.40
Y	1.7596	1.7698	1.7804	1.7912	1.8024	1.8139

9. Write a program in C to find f(2.02) having given the following table, using Newton's forward Interpolation formula correct to five significant figures.

X	2.0	2.2	2.4	2.6	2.8	3.0
f(x)	0.30103	0.34242	0.38021	0.41497	0.44716	0.47721

10. Write a program in C to find f(2.91) having given the following table, using Newton's Interpolation formula, correct to five significant figures.

X	2.0	2.2	2.4	2.6	2.8	3.0
f(x)	0.30103	0.34242	0.38021	0.41497	0.44716	0.47721

11. Write a program in C to find the missing element in the following table:

X	22	25	28	31	34	37
f(X)	14	27	35	?	50	65

12. Write a program in C to find the value of X when it is given that f(X) = 55 in the table given in Assignment 11 after finding the value of f(31).

13. Solve by Gauss elimination method with partial pivoting, the following system of equations correct up to four significant figures.

$$x + 3y = 2z = 5$$
$$2x - y + z = -1$$
$$x + 2y + 3z = 2$$

14. Find the inverse of the following matrix by Gauss-Jordan method.

```
5  3  7
1  5  2
7  2  10
```

Hence find the root of the following system of equations correct up to five decimal places:

$$5x + 3y + 7z = 5$$
$$x + 5y + 2z = -1$$
$$7x + 2y + 10z = 5$$

15. Solve, by Gauss-Jacobi iterative method, the following system of equations correct up to four significant figures.

$$4.50x + 0.15y + 0.30z = 1.57$$
$$0.15x - 10.50y + 0.45z = -3.86$$
$$0.45x + 0.30y - 15.00z = 14.28$$

16. Solve, by Gauss-Seidel iteration method, the following system of equations, correct up to four significant figures.

$$6.32x - 0.73y - 0.65z + 1.06t = 2.95$$
$$0.89x + 4.32y - 0.47z + 0.95t = 3.36$$
$$0.74x + 1.01y + 5.28z - 0.88t = 1.97$$
$$1.13x - 0.89y + 0.61z + 5.63t = 4.27$$

17. Write a program in C to calculate the approximate value of the following definite Integralsusing Trapizoidal rule, taking 20 subintervals, correct up to 6 significant figures. Calculate the percentage of error present in the result for (i).

(i) $\int_1^3 (11 + 4x + 5x^2)dx$

(ii) $\int_0^{0.5} \sqrt{\frac{1-0.75x^2}{1-x^2}} dx$

18. Write a program in C to calculate the approximate value of $\int_0^{0.5} \frac{dx}{\sqrt{(1-x^2)(1-0.75x^2)}}$ correct up to 7 significant figures, using Simpson's 1/3 rule, taking 30 subintervals.

19. Write a program in C to calculate the approximate value of $\int_0^1 \frac{dx}{x^2 - 2x + 3}$ correct up to 4 significant figures, using Simpson's 1/3 rule and Trapizoidal rule, taking 18 subintervals. Compare the results by calculating percentage error. (Assume the result

correct upto 7 significant digits as the exact value.)

20. Write a program in C to calculate the approximate value of $\int_{2}^{3} \frac{dx}{(x-1)\sqrt{x^2-2x}}$ correct up to 6 significant figures, using Simpson's 3/8 rule.

21. Write a program in C to compute y(1.0), correct up to 7 significant figures, by Euler's method

$$\frac{dy}{dx} = -\frac{y}{1+x} \; ; y(0.2) = 2, \text{taking step length } h = 0.01.$$

22. Write a program in C to compute y(1.0), correct up to 5 significant figures, by Euler's method and Modified Euler's method from the following differential equation:

$$\frac{dy}{dx} = 1 + x + x^2; \; y(0) = 1,$$

taking step length h = 0.25. Compare the results (approximate values) obtained in both the cases with the exact value.

23. Write a program in C to compute y(0.6), correct up to 7 significant figures by the method of Runge-Kutta of second order from the following differential equation:
dy/dx = $(0.5 - x + y^2) / (x^2 + y + 1)$; y(0) = 0, taking step length h = 0.1.

24. Write a program in C to compute y(0.5), correct up to 7 significant figures, by the Modified Euler's method and Runge-Kutta method of second order from the following differential equation:
dy/dx = $0.25 y^2 + x^2$; y(0) = -1,
taking step length h = 0.1 . Hence, compare the results.

26. Write a program in C to represent a set of 100 bivariate data of the form (x, y) into a two way frequency table and then calculate $\bar{x}$ and $\bar{y}$ from the marginal distributions. Generate the (x, y) tuples using random numbers so that $0 \le x \le 51$ and $150 \le y \le 250$.
Write a program in C to compute the correlation coefficient between X and Y.

X	2.52	2.49	2.49	2.45	2.43	2.42	2.41	2.40
Y	740	720	780	900	960	1020	980	1040

27. Ten students obtained the following marks in Mathematics and Statistics. Calculate the rank correlation coefficient between these two sets of data using a C program.

Student	1	2	3	4	5	6	7	8	9	10
Marks in Mathematics	78	36	98	25	75	82	90	62	65	39
Marks in Statistics	84	51	91	60	68	62	86	58	53	47

28. Write a program in C to predict the value of x when the value of y is given and vice versa from a given bivariate data set.

REFERENCE BOOKS

1. Mollah S. A., "Numerical Analysis and Computational Procedures," Books and Allied (P) Ltd., Kolkata, 2017.
2. Sastry S.S., "Introductory Methods of Numerical Analysis," PHI, Private Ltd., New Delhi.
3. Pal N. & Sarkar S., "Statistics: Concepts and Applications," PHI, New Delhi, 2005.
4. Das N. G., "Statistical Methods," Tata McGraw Hill Edu. P. Ltd., New Delhi, 2010.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

PROGRAM ELECTIVE (SEC -I I)

COURSE INFORMATION SHEET

Course code: CA181
Course title: DESIGNING AND PUBLISHING IN COMPUTER USING PAGEMAKER, PHOTOSHOP AND CORELDRAW LAB.
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: I/1
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

A	Able to create a new document using page maker
B	Learn the advantages of PageMaker
C	To understand the idea of Photoshop
D	To know the applications of PageMaker and Photoshop.
E	To understand the basic concepts of coral draw

Course Outcomes

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

1	Identify the application of Photoshop, coral draw and PageMaker
2	Apply the basic idea of PageMaker to create and modify a page
3	To analyse a photo using Photoshop
4	Apply PageMaker to manage a page in better way
5	Create a template to solve a real time problem

Topics Covered

1. **PAGEMAKER**
2. **INTRODUCTION**
   Introduction to Desk Top Publishing, Introduction to Page Maker Advantages, Using the Mouse, Components of the Page Maker Window
3. **CREATING A NEW DOCUMENT**
   Setting the Margins, Setting the Page Size, Changing the page Orientation, Setting Page Numbers, Changing the Page Size view, Creating New Document Windows: Displaying the Rulers, Changing the Rulers, Using Rulers, Using Guidelines, Positioning Guidelines., Adding Guidelines to Master Pages. Aligning to Guidelines, Displaying Guidelines, Locking Guidelines. Formatting Types: Changing Font Families, Changing Fond Sizes, Changing Typeface Style, Changing Character Specifications: Changing Type leading, Changing Character Widths, Changing Tracking, Changing Type Options. Saving Your Document: Saving a new Document, Saving an existing Document, Saving a Document as another document, Reverting to a Previously Saved Version. Developing Paragraphs: Typing Text, Adding special Characters to Text, Aligning Text. Formatting paragraphs: Changing Indents, Changing the space around Paragraphs, Changing paragraph Alignment, controlling How Paragraphs Break Between Pages and Columns, Adding lines Above or Below Your Paragraphs.
4. **INTRODUCTION TO CREATING FRAMES**
   Converting Other Objects to Frames, Threading and Unthreading Text. Threading additional Text, Threading Text to Different Page, Unthreading Text Blocks, Rethreading Text Blocks, Making Text Blocks Disappear Without Deleting them, Selecting and Dragging Text, Editing Deleting Text, Cut, Copying, Pasting Text, Viewing the Contents of Clipboard, Using Undo and Revert. Inserting and Removing Pages: Inserting and Removing Pages, Adjusting Spacing of Characters, Words, Lines Adjusting, Spacing and Leading, Setting and changing Tabs.
5. Introduction to Auto Flow, page maker Plug-Ins, Drop Cap, Change Case, Bullets and Numbering.
6. **ADDING DESIGN ELEMENTS- INTRODUCTION**
   Adding Graphics to your Document, Adding Lines, Changing Lines Specifications, Adding Shapes, changing Shape specifications, Changing Line and fill, Specifications together (Fill and Stroke), Changing Round Corners, Creating Drop-Shadow, Boxes, Text wrap, Changing page maker Options: Adjusting Margins, Setting and Adjusting Columns, Setting Unequal Width Columns, Creating headers and Footers, Creating Graphics in page maker, Rotating Text, Skewing and Mirroring objects with Control Palette. Importing Graphics into page maker: Placing, Sizing, aligning Graphics, Cropping Graphics.
7. **SETTING UP TEMPLATES**
   Setting Up Master Page Templates, Creating Custom Page Sizes, Creating Custom Boarders, Creating a News Paper Template, Creating New master Pages, Saving an existing Page As a Master Page. Setting UP Custom Styles: Defining Styles, Creating, Editing, Removing Styles and Copying Styles.

8. **Introduction to Using layers**

TEXT BOOK
1. KumarArchana, "Computer Basics with office Automation", IK International Publishing,2010, ISBN 9789380578620.

REFERENCE BOOK
1. Prof. JainSatish, Kratika, GeethaM., "BPB's Office 2010 Course Complete Book For Learning Better And Faster".

Lab Section [each Day 50 mints x 2 = 100 mints]

1.Installation of Operating Systems
2. Working with Windows Operating system.
3. Get familiar with Linux Operating.
4. Lab in MS-Word/ Writer
5. Document formatting in word/Mail Merge
6. Printing in Word.
7. Lab in MS-Excel
8. Formatting in Excel
9. Working with Multiple worksheet/Formulas/Sorting /Filtering
10. How to configure a Samba Server
11. Graphs in Excel.
12. Introduction to Desk Top Publishing.
13. Creating documents using Adobe Photoshop.
14. Lab in Photoshop.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA280
Course title: HTML Programming LAB
Pre-requisite(s): HTML, XML
Co- requisite(s): Web Programming Lab
Credits: 3   L:3   T:0   P: 0
Class schedule per week: 03
Class: BCA
Semester / Level: IV/2
Branch: BCA
Name of Teacher:

Course Objectives

This course enables the students:

A.	To learn about basics of web programming
B.	Learn HTML, Java Script, XML for scripting
C.	Learn web based programming using ASP.NET
D.	Learn PHP based programming
E.	Learn Making static and dynamic websites

Course Outcomes

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

1.	Know the fundamentals of web programming
2.	Identify .NET technology and framework
3.	Elaborate on the web based programming
4.	Perform web based programming.
5.	Design static and dynamic websites

SYLLABUS

1. Create a web page having background color Navy, text color Chocolate and title 'My home page'.

2. Create a web page giving details of your enrolment no., name and address with all possible text formatting style.

3. Create a web page to display 'Internet & Web Technology' with different heading.

4. Create a web page to display a marquee (containing both text and images) in all possible direction. While doing so control the speed of marquee. Use also different behavior values.

5. Create a web page which contains two divisions with different appearance.

6. Create a web page which will implement all the elements available in head section.

7. Create a web page showing a nested ordered list of the index page of your book.

8. Create a web page showing a nested unordered list containing the branches available in your centre.

9. Create a web page which will implement the definition list.

10. Create a web page to create an external link to a hypermedia document. Use the target attribute.

11. Create a web page to create a bookmark in the same document.

12. Create a web page to create a vertical menu using unordered list and hyperlinks.

13. Create a web page which contains images in four corners of the web document.

14. Create a web page which will implement the image mapping.

15. Create a web page to run swf (flash file) using object element.

16. Create a web page to display the following table structures:

17. Create a web page which contains a table as follows: (enter at least 5 records & use appropriate table heading, caption and footer)

Roll	Name	Marks obtd.

No.	First	Middle	Surname	I&WT		DBMS		CN
				Theory	Lab	Theory	Lab	

18. Create a web page having two equal frames, one containing link and other containing page to be displayed. When the link is clicked the appropriate content should be displayed in second frame.

19. Create a web page to perform the above task using iframe.

20. Create a web page which contains header, container and footer sections. The container section further subdivided into left, middle and right subsection. Use **css** to design this web page.

21. Create a simple form accepting:
Enrolment Number
Student Name
A Submit and Reset button
(while doing the above process try to understand the difference between get & post methods)

22. Design a Resume form with all possible type of form elements.

Color: Black, Bisque, Chocolate, Crimson, Darkgrey, Navy, Lime

23. Write a JavaScript asking first name, middle name and surname and then print Hello [User Name].

24. Write a JavaScript to create a dialogue box containing "Welcome to my website".

25. Write a JavaScript to calculate simple interest using prompt, alert and confirm.

26. Write a JavaScript to calculate simple interest using html form.

27. Write a JavaScript to display a time and print message accordingly for eg. Good Morning.

28. Using JavaScript display a digital clock.

29. Using JavaScript create a simple calculator using html form.

30. Write a JavaScript that would ask the user if he wants a greeting message and if he does, display a Gif file called Greeting.gif and display "Hello Greeting of the day!" in the document window following the image Greeting.gif otherwise flash an alert "Bad day!"

31. Write a JavaScript to scroll the text on status bar.

32. Write a program to change color of current html document's background randomly.

33. Write a JavaScript to move a text with mouse pointer.

34. Write a JavaScript to implement an image rotator.

35. Write a JavaScript to implement a banner changer.

36. Write a JavaScript code to create a pull down menu box using a div.

37. Create a web page using two image file which switch b/w one another as the mouse pointer moves over the image.

38. Write a JavaScript to create small window in main window.

39. Create a web page which will implement the image mapping. Write JavaScript to display different information (use show/hide div) on selecting the different segment of the image.

40. Write a JavaScript to check for null & empty string.

41. Using JavaScript create a web page with two forms one customer copy and one office copy when user enters date in customer copy it gets updated in office copy.

42. Create a student Grade entry form. Use JavaScript for authentication and verification of the textboxes in the html form developed by you.

43. Write a JavaScript to verify whether email address provided by user is valid or invalid.

44. Create a well formed xml document which will display a Telephone directory. Use css.

45. Create a valid xml document which contains the DTD (both internal & external) structure of the Cd catalog. Use Xsl (XSLT is the recommended style sheet language of XML).

46. Create a SAX Parser to display the Cd catalog data stored in a valid xml document.

47. Using <xsl:for-each> display all records available in well-formed xml document containing book info.

48. Create a Jsp page to implement a simple calculator.

49. Create a Jsp page to display day of the week.

50. Create a Jsp page to perform database connectivity with either MS Access or Oracle.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	3	2	1	2	1
CO2	3	3	3	3	2	1	2	2
CO3	3	3	3	3	2	1	2	1
CO4	3	3	3	3	1	1	1	1
CO5	3	3	3	3	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA201
Course title: OBJECT ORIENTED PROGRAMMING USING JAVA
Pre-requisite(s): Introduction to Structured Programming
Co- requisite(s): JAVA Lab
Credits: 3   L: 3   T: 0   P: 0
Class schedule per week: 03
Class: BCA
Semester / Level: III/2
Branch: BCA

Course Objectives
This course enables the students to:

A.	Learn about Object oriented programming concepts
B.	Learn how to use the JDK
C.	Improve their programming skills in core Java
D.	Use the Java packages, applets for software development
E.	Use the knowledge of object-oriented programming through Java

Course Outcomes
After the completion of this course, students will be able to:

1.	Elaborate the use of JDK of various versions for programming
2.	Identify the latest know-how related to the new developments in the field of Java
3.	Apply the knowledge gained for their project work as well as to develop some GUI applications.
4.	Design solutions in JAVA
5.	Apply features of Advanced Java through programming

SYLLABUS

Module I:

Procedure-Oriented Programming, Object-Oriented programming, Benefits of OOP, Applications of OOP, Basics, Evolution of Java, Structure of JAVA Program, Simple Java Program, Tokens, Comments, Identifiers, Operators, Literals, Control Structures. Java Environment Setup, Compiling a Java Program, Java Virtual Machine, Philosophy of Java and Benefits.

(8L)

Module II:

Data types and program statements: Primitive and reference data types, variables and constants, enumerated constants, labelled statement, expression and null statements, compound statement, control statement – decision and loops, jump statement, declaration statement, try-throw-catch-finally statement, declaring and creating arrays, accessing array elements, assigning values to array elements, multidimensional arrays.

(8L)

Module III:

Functions, Data Abstraction and classes: Declaration, definition and call, main method arguments, reference variables, method overloading, parameter passing by value for primitive types, object references and arrays, scope of variables, return from methods.

Class and object, class members and initialization, access rights of members – public, private and protected access modifiers, constructor and copy constructor, mutability, finalization, dynamic memory management, garbage collection, this keyword, static members, scope of variables, interface – declaration, implementation and extending, package and package visibility.

(8L)

Module IV:

Inheritance and Collection classes: multi-level and single inheritance, multiple inheritance of interfaces, Object class, access rights in subclasses and packages, constructor calling sequence, super keyword, dynamic binding of methods, abstract class, overriding, shadowing and hiding, finalize, association, aggregation and composition.

String, StringBuffer, Date, Calendar, Math, Object, Class, Exception class.

Module V:

Input/Output and JAVA Applets: Stream clases – InputStream, OutputStream, Buffered Stream, file classes and handling, pushback streams, reader and writer classes, file reader and writer, serialization.

Applet code example, HTML tags for applet, applet life cycle, color, font andbasic GUI handling, basic graphics, and animation.

(8L)

TEXT BOOK
1. Balagurusamy E., "Programming in Java", 2nd Edition, Tata McGraw Hill Publication, New Delhi.

REFERENCE BOOKS
1. Naghton Patrick & Schildt H., "The Complete Reference Java 2", Tata McGraw Hill Publication, New Delhi.
2. Dietel Harvey M & Dietel Paul J., "Java How to program", 7th edition, Pearson Education, New Delhi.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA203
Course title: DATABASE MANAGEMENT SYSTEMS
Pre-requisite(s):
Co-requisite(s):
Credits: 4   L:3   T:1   P:0
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: BCA
Type: Lecture

Course Objectives

This course enables the students to:

A.	To understand the structure of databases
B.	To learn Query processing and decomposition.
C.	To understand how to create a database
D.	To learn transaction processing in databases
E.	To understand how concurrency control is performed in a database.
F.	To understand fault tolerance and reliability of database.

Course Outcomes

Upon successful completion of this course, the students are expected to:

1.	Design a database for a given set of requirements.
2.	Use SQL.
3.	Apply normalization techniques on given database.
4.	Have knowledge of 'indexing and hashing' mechanisms in a database management system.
5.	Have idea of the backend activities involved in extracting data from a database.Have knowledge of transaction and concurrency control mechanisms in a database management system.

SYLLABUS

Module I:
Introduction: Purpose of Database Systems, View of Data, Data Models, Database Languages, Relational Database, Database Architecture, Database Users and Administrators, Transaction Management.

(8L)

Module II:
Relational Data Models and Languages: Basic Concepts, Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R Features, Reduction of an E-R Diagram to Tables, The Relational Algebra, The Tuple Relational Calculus and The Domain Relational Calculus.

(8L)

Module III:
Relational-Database Design: Pitfalls in Relational-Database Design, Functional Dependencies, Decomposition, Desirable Properties of Decomposition, First Normal Form, Second Normal Form, Third normal Form, Boyce-Codd Normal Form, Fourth Normal Form and More Normal Forms.

(8L)

Module IV:
Query Processing and Optimization: Overview, Measures of Query Cost, Selection Operation, Join Operation, Other Operations, Evaluation of Expressions, Transformation of Relational Expressions, Estimating Statistics of Expression Results, and Choice of Evaluation Plans.

(8L)

Module V:
Transactions and Concurrency Control: Transaction Concept, Transaction State, Desirable Properties of Transactions, Concurrent Executions, Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols and Deadlock Handling.

TEXT BOOK
1. Silberschatz, Korth, & Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2011.

REFERENCE BOOKS
1. Elmasri, & Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2008.
2. Date C.J., "An Introduction to Database System", Pearson Education, New Delhi, 2005.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
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CD6	Self- learning such as use of NPTEL materials and internets
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Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET
Course code: CA220
Course title: INTERNET TECHNOLOGIES
Pre-requisite(s): COMPUTER NETWORK, WEB PROGRAMMING
Co- requisite(s): IT LAB
Credits: 3   L:3   T:1   P:0
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: BCA

Course Objectives
This course enables the students to:

A.	To learn about basics of Internet Technologies.
B.	Learn XML
C.	Learn Server Side Programming.
D.	Learn Java Servlet.
E.	Apply Internet based Programming and web applications.

Course Outcomes
After the completion of this course, students will be able to:

1.	Evaluate and analyse requirements of Internet technologies
2.	Compare among the existing web based programming concepts
3.	Create web based application.
4.	Interactive server side application.
5.	Implement dynamic web applications.

SYLLABUS

Module I:
Internet Basics: Introduction to Internet, Client Server model, Internet IP Address, Domain Name, Domain Registration, Internet Services, A Brief Overview of TCP/IP and its Services, Hyper Text Transfer Protocol: Introduction, Web Servers and Clients, IP Address, Cyber Laws, URL and its Anatomy, Message format, Testing HTTP Using Telnet, Persistent and Non persistent Connections, Internet Security, Web Caching, Proxy.

(8L)

Module II :
History of HTML and W3C, HTML and its Flavours, HTML Basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images, Meta Tag, Planning of Web Page, Model and Structure for a Website, Designing Web Pages, Multimedia Content Frames, Cascading Style Sheet:Introduction,Advantages, Adding CSS, Browser Compatibility, CSS and Page Layout, Selectors.

(8L)

Module III:
XML Technologies: Common Usage, Role of XML,Prolog,Body, Elements, Attributes, Validation, Displaying XML, Namespace. XML DTD: XML Schema Languages, validation, Introduction to DTD, Purpose of DTD, Using a DTD in an XML Document, Element Type Declaration, Attribute Declaration, Entity Declaration.
Parsing XML: XML DOM, DOM Nodes, The Node Interface, Document Node, Element Node, Text Node, Attr Node, Java and DOM

(8L)

Module IV:
Server Side Programming: Servlet : Server –Side JAVA, Advantages Over Applets , Servlet Alternatives , Servlets Strengths , Servlet Architecture, Servlet life Cycle , Generic Servlet and Http Servlet, First Servlet , Passing Parameters to Servlets , Retrieving Parameters , Server side Include , Cookies, Filters, Problems with Servlet, Security Issues , Java Server Pages : Introduction and Marketplace , JSP and HTTP, JSP Engines, How JSP Works , JSP and Servlet, Anatomy of JSP page , JSP Syntax , JSP Components.

(8L)

Module V:
Session Tracking: User Passing Control and Data between Pages, Sharing Session and Application Data, Data Base Connectivity, JDBC Drivers, Basic Steps, Loading a Driver, Making a connection, Execute an SQLStatement, SQl Statements, Retrieving Result, GettingDatabase Information, Scrollable and Updatable Result Set, Result Set Metadata.

(8L)

TEXT BOOK
1. RoyUttam K., "Web Technology", Oxford University Press.

REFERENCE BOOKS
1. EtalXue Bai, "The Web Warrior Guide to Web Programming", Thomson Learning, 2003.
2. XavierC., "Web Technology & Design", New Age International Publishers, 1st Edn, New Delhi, 2004.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
      1. Student Feedback on Faculty
      2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	2	1	3	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	3	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA222
Course title: MOBILE APPLICATION
Pre-requisite(s): COMPUTER NETWORK, OPERATING SYSTEMS
Co- requisite(s): NONE
Credits: 3   L: 3   T: 1   P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: BCA

Course Objectives

This course enables the students:

A.	To know about the mobile architecture with its different tires
B.	To know the mobile infrastructure and its components
C.	To adopt existing application and mobilizing and upgrading them for further use.
D.	To learn to compare mobile and native applications
E.	To gain knowledge of different architecture.

Course Outcomes

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

1.	Be competent with the characterization and architecture of mobile applications.
2.	Be competent with understanding enterprise scale requirements of mobile applications
3.	Be competent with designing and developing mobile applications.
4.	Be competent with comparatively evaluating the capabilities
5.	Be exposed to technology and business trends impacting mobile applications

SYLLABUS

Module I:
Introduction, Developing Mobile Applications, Going Mobile, People Perspective, Mobilizing the Enterprise.

(8L)

Module II:
Mobile Application Architectures, Client-Server layers and Tires, Client thin and fat & web page Hosting, Server one, two and three tire architecture, Connection type with always, partially and never connect, Good Architectural Design Tenets

(8L)

Module III:
Mobile Infrastructure, Mobile Device Types, Mobile Device Components, Connection Methods

(8L)

Module IV:
Mobile Client Applications, Thin Client, Fat Client, Web Page Hosting, Best Practices

(8L)

Module V:
Mobilizing existing application architectures. Evolution of Enterprise Architectures, Anatomy of Enterprise Web Architecture, Considerations When Mobilizing Existing Applications, Types of Mobile Applications, Mobile Web Apps Versus Native Applications, Mobile Web Apps Versus Native Applications, Mobile 2.0

(8L)

TEXT BOOKS
1. SchellRobbie, SchneiderHeather, LeeValentino, "Mobile Applications: Architecture, Design, and Development", Prentice Hall 2004.
2. FlingBrian, "Mobile Design and Development", O'Reilly Media, 2009.

REFERENCE BOOK
1. McWherterJeff, GowellScott, "Professional Mobile Application Development", John Wiley & Sons 2012.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

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CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

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MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
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CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA202
Course title: OBJECT ORIENTED PROGRAMMING USING JAVA LAB
Pre-requisite(s): INTRODUCTION TO STRUCTURED PROGRAMMING
Co- requisite(s): JAVA Lab
Credits: 2   L: T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: BCA

Course Objectives

This course enables the students to:

A.	Learn about Object oriented programming concepts
B.	Learn how to use the JDK
C.	Improve their programming skills in core Java
D.	Use the Java packages, applets for software development
E.	Use the knowledge of object-oriented programming through Java

Course Outcomes

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

1.	Elaborate the use of JDK of various versions for programming
2.	Identify the latest know-how related to the new developments in the field of Java
3.	Apply the knowledge gained for their project work as well as to develop some GUI applications.
4.	Design solutions in JAVA
5.	Apply features of Advanced Java through programming

SYLLABUS

List of Programs as Assignments:

1. WAJP to show the characteristic of a number. {E.g. 24 it has two coefficients 2 in tens position and 4 in units position. It is composed of 2 and 3. It is a positive number. Also show whether it is odd or even.
2. WAJP to take input through command line argument and do the following:
   a) Check whether the number is prime.
   b) Generate the reverse a number.
3. Write a menu driven program using switch in Java to perform following:
   a) For input of 1, check whether the number is prime
   b) For input of 3, find the factors of the number
   c) For input of 5, check the number is odd or even.
4. Write a program in Java to generate hexadecimal equivalent of a number without using array.
5. WAJP to take two number inputs through command line argument and do the following:

   a) Check whether two numbers are prime to each other or not.

   b) Find LCM of two numbers.

6. WAJP to create a class and exhibit the role of static functions (other than main) by declaring, defining and calling them.

7. WAJP to compute and display the count of occurrence of 4 in a number. E.g. 4564 will compute 2.

8. WAJP to take an angle value in degrees and then compute the equivalent radians and then prove $\sin^2\theta + \cos^2\theta = 1$. Note $180^o = \pi^c$.

9. WAJP to sort a list of numbers in ascending order.

10. WAJP to generate Pascal's Triangle using a square matrix.
11. Write a program in Java to take input of two 3×3 matrices through command line argument and then:
    a) Add them up and display the result

    b) Subtract them and display the result

    c) Multiply them and display product
12. WAJP to count the number of words, characters in a sentence.

13. Write a program in Java to take input of a sentence through command line argument and then count the number of words and vowels.
14. WAJP to handle the Exception using try and multiple catch block; the exceptions that you will handle are, number format error, array bound error and divide by zero.

15. WAJP to create a class called **Room** with two data member length and width and then implement constructor overloading in it.

16. Write a program in Java to explain the role of the following:
    a) Non-parameterized constructor
    b) Parameterized constructor
    c) Copy constructor

Take input and display the output.

16. WAJP to create a class called **Fraction** with data member numerator and denominator; take input (through command line argument) of two fractions and then add, subtract, multiply and divide, finally display the result in reduced term.

17. Write a program in Java to create a class for **Employee** having 2 data member code and name. Then create 3 classes **Officer**, **AdminStaff** and **MStaff**. The **Officer** class has data members designation and pay-scale; the **AdminStaff** has data members grade and pay-band; the **MStaff** has data member department and two sub-classes **Regular** and **Casual**. The **Regular** staff has data members level and consolidated-pay and **Casual** has data member daily-wage. Take all inputs through constructors and write appropriate methods for displaying one data for each type of class.

18. WAJP to design a class called **Account** using the inheritance and static that show all function of bank (withdrawal, deposit) and generate account number dynamically.

19. WAJP to design an application *Password.java* that produces and prints a random password depending upon name of an individual. If the input is Abdul Kalam then the password would be *33421LAM*. Note: take the first name A=1, B=2, D=4, U=21 where 2+1=3, and L=12, where 1+2=3; so the number comes to be *12433*, so u can find out.

20. WAJP to draw a format like
```
            *
           ***

          *****

         *******

          *****

           ***

            *
```

21.   WAJP to take a string count all vowels and then delete the same from the string.
22.   Write a **Patient** class which inherits from the **Person** class. Patient can again be of two types, indoor and outdoor. The Patient class requires the following:
    a) a variable to store the patient ID for the patient
    b) a variable to store the department of hospital
    c) a variable to store the ward of hospital
    d) a variable to store the patient 's date of joining the hospital
    e) a variable to store the patient 's address
    f) a variable to store the medical fees that the patient pays
    g) constructor methods, which initialize the variables
    h) a method to calculate the medical fees (for both indoor and outdoor patient)

23. WAJP to take a string as password and check whether it contains at least two numbers, 3 alphabets and no space in it. If any contrary throw message.
24. Write a program in Java to create a class called Rational having two data members for numerator and denominator. Take two inputs of rational numbers and perform multiplication and division. Display the result in reduced form.

25. Write a program in Java to print a format like,   * * * * * * *
                                                                          * * * * *
                                                                          * * *
                                                                          *

26.   Write a class called **Shape** which contains a user-defined interface for **Computation**, which contains methods for calculation of area, perimeter and volume. Write four classes for **circle, rectangle, sphere** and **rectangular parallelepiped**, and all these classes inherit from Shape. Now take input for the following:
   a) radius of circle and compute its area and perimeter
   b) Length and breadth of rectangle and compute its area and perimeter
   c) Length, breadth and height for **rectangular parallelepiped** and compute its area and volume
   d) Radius of sphere and compute its area and volume

** Area of circle=πr^2, perimeter of circle=$2\pi r$, area of sphere=$4\pi r^2$, volume of sphere=$\frac{4}{3}\pi r^3$, volume

of rectangular parallelepiped $= l \times b \times h$ area of rectangular parallelepiped=$2(l \times b + b \times h + h \times l)$

27.   Write a class called Employee, which requires the following:
   a) a variable to store the employee ID
      a. employee ID should be of format EMP**M**1234, EMP**S**1234, EMP**A**1234, EMP**C**1234, where M=manager, S=supervisor, A=analyst, C=clerk; number can be any no. but first three characters should be EMP
   b) a variable to store the employee name
   c) a variable to store department
   d) a variable to store city
   e) a variable to store basic salary
   f) a method to calculate the salary of employee
      a. if the city is metro then the HRA would be 30% else 20%
      b. if the employee ID contain M then DA would be 120%, if S then DA would be 110%, if A then DA would be 100%, and if C then DA would be 90%
   g) constructor methods, which initialize the variables
28.   WAJP to create 4 threads and show exhibit their execution after the call of the "start ( )" method.
29. Write a program in Java to create 3 threads and exhibit their behaviour by changing their priorities in the "main" thread. Display the possible output.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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Course Delivery Methods

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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
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CO5	3	3	3	1	2	1	1	2

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MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA204
Course title: DATABASE MANAGEMENT SYSTEMS LAB
Pre-requisite(s):
Co-requisite(s):
Credits:2   L: T: P:2
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: BCA

Course Objectives

This course enables the students to:

A.	To understand the structure of databases
B.	To learn Query processing and decomposition.
C.	To understand how to create a database
D.	To learn transaction processing in databases
E.	To understand how concurrency control is performed in a database.
F.	To understand fault tolerance and reliability of database.

Course Outcomes

Upon successful completion of this course, the students are expected to:

1.	Design a database for a given set of requirements.
2.	Use SQL.
3.	Apply normalization techniques on given database.
4.	Have knowledge of 'indexing and hashing' mechanisms in a database management system.
5.	Have idea of the backend activities involved in extracting data from a database.Have knowledge of transaction and concurrency control mechanisms in a database management system.

SYLLABUS

List of Programs as Assignments:

Consider the following tables:

emp(empno,ename,job,mgr,hiredate,sal,comm,deptno,gr),

dept(deptno,dname,loc)

Write the following queries:
1.   List all information about all department from emp table.
2.   List all employee names along with their salaries from emp table.
3.   List all department numbers, employee numbers and their managers numbers in   descending order of deptno from emp table.
4.   List department names and locations from the dept table.
5.   List the employees belonging to the department 20.
6.   List the name and salary of the employees whose salary is more than 1000.
7.   List the names of the clerks working in the department 20.
8.   List the names of analysts and salesmen.
9.   List the details of the employees who have joined before the end of September 81.
10.   List the names of employees who are not managers.
11.   List the names of employees whose employee number are 7369, 7521, 7839, 7934, 7788.
12.   List the employee details not belonging to the department 10, 30, and 40.
13.   List the employee name and salary, whose salary is between 1000 and 2000.
14.   List the employee names, who are not eligible for commission.(salary having >15,000 eligible for commission)
15.   List the employees who are eligible for commission.
16.   List the details of employees, whose salary is greater than 2000 and commission is   NULL.
17.   List the employees whose names start with an "S" (not"s").
18.   List the name, salary and PF amount of all the employees(PF is calculated as 10% of salary).
19.   List the empno, ename, sal in ascending order of salary.
20.   List the employee name, salary, job and Department no descending order of Department No and salary.
21.   List the employee details in ascending order of salary.
22.   List the employee details in descending order of salary
23.Display name, and sal and commission of all employees whose monthly salary is   greater than their commission.
24.   Select SMITH HAS WORKED IN THE POSITION OF CLERK IN DEPT 20.Display   result in this format.
25.   Generate a statement which prompts the user at runtime. The intention is to display   employees hired between 2 given dates.
26.   Define a variable representing an expression used to calculate total annual remuneration. Use the variable in a statement which finds all employees who   earn $30000 a year or more.

27. List all the employees name and salaries increased by 15% and expressed as a whole   number of dollars.
28.Produce the following
          EMPLOYEE AND   JOB

SMITH	CLERK
ALLEN	SALESMAN

29. Produce the following output:

SMITH   (Clerk)
ALLEN   (Salesman)

30. Do a case sensitive search for a list of employees with a job that the user enters.
31. It has been discovered that the sales people in dept. 30 are not all male. Please produce the Followingoutput.

ENAME   DEPTNO   JOB

ALLEN   30   Sales Person

32. Display each employees name and hiredate of dept 20.

33. Display each employees name, hiredate and salary review date. Assume salary review date is one year from hiredate. Output should be in ascending review date.

34. Print list of employees displaying just salary, if more than 1500. If exactly 1500 display " On Target". If less than 1500 display " Below 1500".

35. Write a query which returns DAY of the week (i.e. MONDAY) for any date entered in the format DD/MM/YY.
36. Write a query to calculate length of service of each employee.
37. Find the minimum salary of all employees.
38. Find the maximum, minimum, and average salaries of all employees.
39. List the maximum and minimum salary of each job type.
40. Find how many managers are in each dept.
41. Find the average salary and average total remuneration of each job type. Remembers sales man earn commission.
42. Find out the difference between highest and lowest salary.
43. Find all department s which have more than three employees.
44. Check whether all employee nos are unique. (No Duplicate)
45. List lowest paid employee working for each Manager. Exclude any groups where the minimum salary is less than 1000. Sort the output by salary.
46. Produce a list showing employees 'salary grade'.(> 10000 A, >10000 &<20000 B, >20000 C)
47. Show only employee on Grade C.
48. Show all employee in Dallas.
49. List the employees name, job, salary, grade and department for everyone in the company except clerks. Sort on salary, displaying the highest first.
50. List the following details of employees who earn $36000 a year or who are clerks.
Ename   Job   Annual Sal   Dept no   Dname   Grade
51. Display all employees who earn less than their managers.
52. Display all employees by name and eno along with their managers name and number.
53. Modify above spoliation to display KING who has no MANAGER.
54. Find the job that was files in the first half of 1983 and the name job that was filled in the same period in 1984.
55. Find all employees who have joined before their manager.
EMPLOYEE HIREDATE   MANAGER   HIREDATE

56. Find the employees who earn the highest salary in each job, type, sort in descending order of salary.

57. Find the employees who earn the minimum salary for their job, Display the result in descending order of salary
.
58. Find the most recently hired employees in the department. Order by hiredate.
59. Show the details of any employee who earns a salary greater than the average for their department. Sort in department number order.
60. List all department where there are no employees.

TEXT BOOK
1.   SQL, PL/SQL the programming Language of Oracle, Ivan Bayross, 4th edition

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
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Semester End Examination	50

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Semester End Examination					

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MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
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CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

PROGRAM ELECTIVE –I   (LAB)

COURSE INFORMATION SHEET

Course code: CA221
Course title: I**NTERNET TECHNOLOGIES LAB**
Pre-requisite(s):
Co- requisite(s):Problem Solving And Programming In Html, Xml. Servlet , Jsp
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: III/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students:

1.	To learn client side web programming
2.	To Learn GUI design at client side
3.	To learn the concept of web server
4.	To know the server side web programming
5.	To know the practical application of various server side programming techniques.

Course Outcomes

After the completion of this course, students will be able:

CO1	To formulate client side HTML programming
CO2	To formulate XML web based applications
CO3	To configure web server
CO4	To apply programming concept to develop server side applications
CO5	To formulate server side applications to bind data bases.

SYLLABUS

List of Programs as Assignments:

1. Create a simple html file to demonstrate the use of different heading tags.
2. Create a simple html file to demonstrate different types of list.
3. Create a simple html file to create a table containing marks of 5 subjects of 10 students.
4. Design a html form for reserving a room in a hotel.
5. Create a html page with different types of frames such as floating frame, navigation frame & mixed frame.
6. Create a html form to find the railway fare from one place to another.
7. Create an XML structure with elements and attributes for Library information system.
8. Create an XML structure with elements and attributes for railway reservation system.
9. Create an XML document for student information system. Create a DTD and link the DTD to the XML document.
10. Create an XML document for employee information system. Create a DTD and link the DTD to the XML document
 11. Create an XML schema for an XML file, which contains information about books that are available in the library.
12. Write a Servlet Program that displays server information (server name, port etc.).
13. Create a servlet program to retrieve the values entered in the html file.
14. Create a servlet program that takes your name and address from a HTML Form and displays it.
15. Write a program to show inter servlet communication between two servlets.
16. Create a simple servlet program to display the date and time.
17. Write a JSP program to output, "Welcome to JSP world."
18.Write a JSP page to display current time.
19. Write a JSP page that display a randomly generated number in first visit to this page and repeat displaying this same number in subsequent visits.
20. Write a JSP page to display current date.
21. Write a JSP page using <jsp:forward> to go to a servlet program which displays your name, date of birth and address.
22. Create a HTML form to take customer information (Name, Address, Mobile No.). Write a JSP program to validate this information of customers.
23. Write a jsp program to display student records stored in the database.
24. Create a form to record student details and store it into the database using jsp.
25. Write a program, using servlet and JDBC which takes students roll number and provides student information, which includes the name of the student, address, email-id, program of study, and year of admission. You have to use a database to store student's information.
26. Write program of Q25. with login and password protection. Display a message if login and password are not correctly given.
27. Create a database of students. Write a program using jsp to display the name, course, semester for those students who have more than 3 backlogs.
28. Create a database of students who are in the 5th Semester of the BCA. Write a program using JSP and JDBC to display the name and address of those students who are born after 1995.

29. Write a program using servlet and JDBC for developing an online application for the shopping of computer science books. You have to create a database for book title, author(s) of book, publisher, year of publication, price. Make necessary assumptions for book shopping.

30. Develop an application that collects/maintains the product information of an electronics goods production company in a database. Write a JSP page to retrieve information from the database on demand. Make necessary assumptions to develop this application.

Books recommended:

TEXT BOOK

1. Deitel,. P.J. Deitel, H.M. "Internet & World Wide Web How to Program", Pearson International Edition, 4th Edition.

REFERENCE BOOKS

1. Xavier C., "Web Technology & Design", New Age International Publishers, 1st Edn, New Delhi, 2004.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

PROGRAM ELECTIVE (SEC-III)

COURSE INFORMATION SHEET

Course code: CA280
Course title: HTML PROGRAMMING
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: I/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

A	Able to understand the basic concepts of HTML
B	Learn the advantages of HTML
C	To understand the structure of HTML page
D	To know the applications of HTML
E	To understand the difference between HTML with other language

Course Outcomes

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

1	Able to create a HTML page
2	Able to analyse a HTML page
3	Able to modify a HTML page
4	Able to create a HTML page using table, background and picture.
5	Able to use CSS for a HTML page.

SYLLABUS

Module I:
Introduction (1L): HTML Document structure
The Basics (2L): Head, Body, Lists: ordered & unordered

Module II:
Links (3L): Introduction, Absolute links & Relative links, using the ID attribute to link within a document

Module III:
Images (2L): Putting an image on a page, using images as links, putting an image in the background

Module IV:
Tables (3L): Creating a table, Table headers, spanning multiple columns, styling table
Forms (3L): Basic input and attributes, other kinds of inputs, styling forms with CSS

TEXT BOOKS
1. "Introduction to HTML and CSS", O'Reilly, 2010.
2. DuckettJon, "HTML and CSS", John Wiley, 2012.

S/w Lab based on HTML:

1. Create an HTML document with the following formatting options:
   a. Text formatting
   b. Heading styles
   c. Font (Type, size and color)
   d. Background (colored background and image in background)
   e. Paragraph/ Division

2. Create a HTML document which consists of
   a. Ordered List
   b. Unordered List
   c. Nested List
   d. Image
3. Create a HTML document which implements internal/ external linking
4. Create a table with the view
5. Create a form using HTML tags which has the following type of controls:
   a. Text Box
   b. Option/ radio buttons/ Check box
   c. Reset and Submit buttons

Module V:
PHP Programming
Introduction to PHP: PHP introduction, important tools & s/w requirement, Scope of PHP, Basic syntax, variable & constants, data type, expressions, scope of variables, operators.
Handling HTML form with PHP: Capturing form data, GET and POST methods, Dealing with multi value fields, Redirecting a form after submission
PHP conditional events & loops: PHP conditional statements, switch case, while, for and do … while loops
PHP functions: Need of function, Default argument, Functions call by value and call by reference
String Manipulation & regular expression: Creating and accessing string, Searching & replacing string, formatting, joining and splitting String, String related library functions
Array: Creating index based and Associative array

S/w Lab based on PHP:

a) Create a PHP login page having user name and password. On clicking submit button, a Welcome message should be displayed if the user is already registered otherwise error message should be displayed.
b) Create a "birthday countdown" script which will count the number of days between current day and birthday.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA 281
Course title: PROGRAMMING IN VISUAL BASIC/GAMBAS
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: I/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students to:

A	Able to understand the basic concepts of Visual Basic
B	Learn the advantages of Visual Basic
C	To understand the structure of Visual Basic
D	To know the applications of Visual Basic L
E	To understand the difference between Visual Basic with other language

Course Outcomes

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

1	Able to create a Visual Basic project
2	Able to solve real-time problem using Visual Basic
3	Able to analyse any logical and numerical problems using Visual Basic
4	Able to create a form using Visual Basic
5	Able to create an application using frontend and backend

SYLLABUS

List of Programs as Assignments:

1. Print a table of numbers from 5 to 15 and their squares and Cubes.
2. Print the largest of three numbers.
3. Find the factional of a number n.

4. Enter a list of positive numbers terminated by zero. Find the sum and average of these numbers.
5. A person deposits Rs. 1000 in a fixed account yielding 5% interest. Complete the amount in the account at the end of each year for n years.
6. Write a VB application to choose your hobbies from a list.
7. Read n numbers. Count the number of negative numbers, positive numbers and zeroes in the list. Use arrays.
8. Read a single dimension array. Find the sum and average of these numbers.
9. Read a two dimension array. Find the sum of two 2D Array.
10. Create a database Employee and Make a form in VB 6.0 to allow data entry to

   Employee Form with the following command buttons:

Employee Form			NEXT
Employee Id			PREVIOUS
Employee Name			FIRST
Date of Joining			LAST
Designation			SAVE
Department			DELETE
Address			ADD
Basic Pay			CANCEL

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
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CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA 284
Course title: PROGRAMMING IN SCILAB
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: I/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students to:

A	Able to understand the basic concepts of SCILAB
B	Learn the advantages of SCILAB
C	To understand the structure of SCILAB
D	To know the applications of SCILAB
E	To understand the difference between SCILABwith other language

Course Outcomes

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

1	Able to write a SCILAB program
2	Able to solve real-time problem using SCILAB
3	Able to analyse any logical and numerical problems using SCILAB
4	Able to create a function using SCILAB
5	Able to create an 3D histogram using 3D histogram

SYLLABUS

List of Programs as Assignments:

1. Write a program in scilab to input an one dimensional array and a 2D array in the console.
2. Write a program in scilab to input a zero array.
3. Write a program in scilab to Input an identity array.
4. Write a program in scilab to input a variable.
5. Write a program in scilab to use the Plot function for drawing a sine wave.
6. Write a program in scilab for 3D ploting using surf function.
7. Write a program in scilab to use the scf and clf function.
8. Write a program in scilab to show the use of histplot.
9. Write a program in scilab to find the area of triangle.
10. Write a program in scilab to find the area of a rectangle.
11. Write a program in scilab to find the addition of two simple 1D array.
12. Write a program in scilab to find all the possible operations on array.
13. Write a program in scilab to find the length of an array.
14. Write a program in scilab to demonstrate the use of matplot function.
15. Write a program in scilab to show the use of champ function.
16.. Write a program in scilab for random number generation using all the function possible in scilab for random number generation.

17. Write a program in scilab to show the use of plot2d2 function.
18. Write a program in scilab to show the use of plot2d3 function.
19. Write a program in scilab to show the use of plot2d4 function.
20. Write a program in scilab to show the use of LineSpec function.
21. Write a program in scilab to find the perimeter of parallelogram.
22. Write a program in scilab to find the volume of an sphere.
23. Write a program in scilab to find the possible operations on complex numbers.
24. Write a program in scilab to find the division of a complex number.
25. Write a program in scilab to display maximum among five numbers.
26. Write a program in scilab to show the animation using comet function.
27. Write a program in scilab to show the animation using paramfplot2d function.
28. Write a program in scilab to show the 3D histogram.
29. Write a program in scilab to calculate the nature of roots of a quadreatic equation. Input data from user.
30. Write a program in scilab to perform the operation on data Through File Reading and Writing.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
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CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA255
Course title: FUNDAMENTALS OF COMPUTER ALGORITHMS
Pre-requisite(s): Knowledge Of Basic Mathematics (Graph Theory) And Data Structures
Co- requisite(s):
Credits: 4   L: 3   T: 1P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: BCA

Course Objectives
This course enables the students:

A.	To understand basic algorithm designing techniques such as divide and conquer, greedy, dynamic programming, backtracking and branch and bound.
B.	To analyze the asymptotic performance of an algorithm.
C.	To demonstrate a familiarity with algorithms and data structures.
D.	To apply important algorithmic design paradigms and methods of analysis in solving real life problems.
E.	To Synthesize efficient algorithms in common engineering design situations.
F.	To have a strong background in algorithm design which would help them to take up challenges in any field of research.

Course Outcomes
After the completion of this course the following outcomes will be achieved:

1.	Students will be able to have a clear understanding on solving the problems systematically.
2.	Students will be able to make use of linear and non-linear data structures, like, graphs and trees while designing algorithms.
3.	Students will be having a clear understanding of different design paradigms.
4.	Students will be able to analyze and measure the efficiency of an algorithm.
5.	Students will have basic knowledge of fundamentals of algorithms which would help them to take up an advanced course in the same field.

SYLLABUS

Module I:
Introduction: What is an algorithm? Design and performance analysis of algorithms, space and time trade-offs. Analysis of selection sort and insertion sort. Asymptotic notations (O, $\Omega, \Theta, \omega, o$,) to measure complexity of algorithms.

(8L)

Module II:
Recursion: Basic concept. Analysis of recursive algorithms, Master's theorem. Divide & Conquer: The general method. binary search, finding the maximum and minimum, merge sort, quick sort, Best and worst case analysis for the mentioned algorithms.

(8L)

Module III:
The Greedy Method: The general method. Applications to Knapsack problem, minimum weight spanning trees: Prim's & Kruskal's algorithms. Dijkstra's algorithm for finding single source shortest paths problem.

(8L)

Module IV:
Algorithm on Graphs: Breadth First Search, Depth First Search, Biconnectivity, Depth First Search of a Directed Graph, Topological Sorting.

(8L)

Module V:
Basic concepts of Backtracking: 8-queen problem, Branch and Bound: 0/1 Knapsack problem, assignment problem.

(8L)

TEXT BOOKS
1. CormenThomas H., LeisersonCharles E., & Rivest.Ronald L., "Introduction to Algorithms", PHI publication.
2. HorowitzEllis, SahniSartaj and RajasekaranS., "Fundamentals of Computer Algorithms", Galgotia publications.

REFERENCE BOOKS
1. AhoAlfred V., HopcroftJohn E. & UllmanJeffrey D., "The Design & Analysis of Computer Algorithms", Addison Wesley Publications.
2. KleinbergJon & TardosEva,"Algorithm Design", Pearson Education Publications.
3. BrassardGilles & BratleyPaul,"Fundamentals of Algorithms", PHI Publications.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
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CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA256
Course title: WEB PROGRAMMING
Pre-requisite(s): HTML, XML
Co- requisite(s): Web Programming Lab
Credits: 3   L:3   T:0   P: 0
Class schedule per week: 03
Class: BCA
Semester / Level: IV/2
Branch: BCA
Name of Teacher:

Course Objectives
This course enables the students:

A.	To learn about basics of web programming
B.	Learn HTML, Java Script, XML for scripting
C.	Learn web based programming using ASP.NET
D.	Learn PHP based programming
E.	Learn Making static and dynamic websites

Course Outcomes
After the completion of this course, students will be able to:

6.	Know the fundamentals of web programming
7.	Identify .NET technology and framework
8.	Elaborate on the web based programming
9.	Perform web based programming.
10.	Design static and dynamic websites

SYLLABUS

Module I:
Introduction to Internet and HTML: Introduction to Internet, Internet Services, Web Server, Web Client, Domain Registration, Internet Security. HTML Tags, HTML Documents, Header Section, Body Section, Headings, Link Documents using Anchor Tag, Formatting Characters, Font tag, Images and Pictures, Listing, Tables in HTML.

(8L)

Module II:
Java Script: Data Types, Variables, Operators, Conditional Statements, Array Objects, Date Objects, String Objects**,** Use of Java Script in Web Pages, Advantages of Java Script, Type Casting, Array, Operators and Expression, Conditional Checking, Function, User Defined Function.

(8L)

Module III:
Understanding XML: Overview of XML, XML Families of Technology, Creating XML Documents, Rules for Well-Formed XML, Discerning Structure, Working with Mixed content, Adding Comments, CDATA Sections, Creating a DTD-The Concept of a Valid XML Document, Creating a DTD for an existing XML File.

(8L)

Module IV:
ASP .NET: Building Web Forms Using ASP .NET, Exploring ASP .NET Server Controls, Using ASP .NET Server Controls to Create Web Forms, Understanding the Code behind the Page. Working with User Controls, Exposing User Control Properties and Methods, Using ASP .NET Server Controls in User Controls, Using Validation Controls to Improve Web Forms, Uploading Files to a Web Server.

(8L)

Module V:
PHP: Preparing the Use PHP, Exploring PHP for the First Time, Understanding PHP Basics, Displaying PHP Output, Managing PHP Program Flow. Planning a PHP Web Application, Creating and Using a Logon Window, Managing System Data, Updating a PHP Web Application.

(8L)

TEXT BOOKS
1. XavierC., "Web Technology & Design", New Age International Publishers, 1st Edn, New Delhi, 2004.
2. BaiXue, Ekedahl Michael, FarrellJoyce, GosselinDon, ZakDiane, KaparthiShashi, MacintyrePeter, Morrissey Bill, "The Web Warrior Guide to Web Programming", India Edition, Thomson Education.

REFERENCE BOOK
1. RossIvan Bay, "Web Enable Commercial Application Using HTML, DHTML", BPB Publication.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
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CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA258
Course title: SOFTWARE ENGINEERING
Pre-requisite(s):
Co- requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: IV
Branch: BCA

Course Objectives

This course enables the students:

A.	To understand the importance, limitations and challenges of processes involved insoftware development
B.	To gain knowledge of various software models.
C.	learn about software requirements analysis and specification
D.	To gain knowledge of various software design activities.
E.	To learn cost estimation, software testing, maintenance and debugging.

Course Outcomes

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

1.	Identify the difference of software engineering discipline with the other engineering disciplines
2.	Elaborate knowledge of various software models.
3.	Analyse about software requirements analysis and specification
4.	Infer from knowledge of various software design activities.
5.	Implement cost estimation, software testing, maintenance and debugging.

SYLLABUS

Module I:
Introduction: S/W Engineering Discipline-Evolution and Impact, Program vs S/W Product, Emergence of S/W Engineering. Software Life Cycle Models: Waterfall, Prototyping, Evolutionary, Spiral models and their comparisons. Software Project Management: Project Manager responsibilities, Project Planning, Project Size Estimation Metrics, Project estimation Techniques, COCOMO, Staffing Level Estimation, Scheduling, Organization& Team Structures, Staffing, Risk Management, S/W Configuration Management.

(8L)

Module II:
Requirements Analysis and Specification: Requirement Gathering and Analysis, SRS Software Design: Overview, Cohesion and Coupling, S/W Design Approaches, Object-Oriented vs. Function-Oriented Design. Function-Oriented S/W Design: SA/SD Methodology, Structured Analysis, DFDs, Structured Design, Detailed Design

(8L)

Module III:
Object Modelling Using UML: Overview, UML, UML Diagrams, Use Case Model, Class Diagrams etc.Object-Oriented Software Development: Design Patterns, Object-Oriented analysis and Design Process, OOD Goodness Criteria. User Interface Design: Characteristics, Basic Concepts, Types, Components Based GUI Development, User Interface Design Methodology.

(8L)

Module IV:
Coding and Testing: Coding, Code Review, Testing, Unit Testing, Black Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing, General Issues. Software Reliability and Quality Management: S/W Reliability, Statistical Testing, S/W Quality, S/W Quality Management System, ISO 9000, SEI CMM, Personal Software Process, Six Sigma.

(8L)

Module V:
Software Maintenance: Characteristics, S/W Reverse Engineering, S/W Maintenance Process Models, Estimation of Maintenance Cost.

(8L)

TEXT BOOK
1. MallRajib, "Fundamentals of Software Engineering", PHI, 2005.

REFERENCE BOOK
1. Pressman, "Software engineering A Practitioner's Approach", MGH.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

PROGRAM ELECTIVE-II

COURSE INFORMATION SHEET

Course code: CA223
Course title: ECOMMERCE TECHNOLOGY
Pre requisite: General Idea of Computer Network & Internet Technology.
Co- requisite:
Credit: 4   L: 3   T: 1 P: 0
Class Schedule Per Week: 04
Class: BCA
Semester/ level: IV/2
Branch: BCA

Course Objectives

This Course enables the student:

A.	To know the basics of E - commerce .
B.	To understand Electronic Data Interchange
C.	To understand Security Issues of E- Commerce
D.	To understand Electronic Payment systems.
E.	To understand Internet Advertising

Course Out comes

After completing this course student will be:

1.	Able to learn E- Commerce perspectives.
2.	Able to learn Electronic Data Interchange.
3.	Able to learn Security majors of E- Commerce.
4.	Able to Manage & Learn Electronic Payment system.
5.	Able to use & Manage Internet Advertisements.

SYLLABUS

Module I:
Introduction to E- Commerce: What is E- Commerce, Impact of E- Commerce, Classification of E- Commerce, Application of E- Commerce technologies, E- Commerce Business Models, Frame work of V E- Commerce.

(8L)

Module II:
Electronic Data Interchange (EDI): Conventional Trading process, what is EDI, Building Blocks of EDI Systems, Layered Architecture, value added networks, Benefits of EDI, Application of EDI.

(8L)

Module III :
E- Commerce – Securing Business & Network Transactions: Why Information on Internet Is Vulnerable?, Security Policy, Procedures & Practices, Site Security, Transaction Security, cryptology, Cryptographic algorithms, Public Key Algorithms, Authentication Protocols, Digital signature, Electronic Mail security, Security Protocols for Web Commerce

(8L)

Module IV:
Electronic Payment Systems: Introduction to Payment systems, Online Payment System, Prepaid Payment systems, Post Paid Payment Systems, Requirements metrics of a payment system.

(8L)

Module V:
Internet Advertising: Emergence of the Internet as a Competitive Advertising Media, Models of Internet Advertising, Banner Advertisements, Sponsoring content, Screen Savers & Push Broadcasting, Corporate website, Interstitials, SuperStitials, Opt-in's, Weaknesses in Internet Advertising.

(8L)

TEXT BOOK
1. BhaskarBharat, "Electronic Commerce – Frame work, Technologies and Applications", Tata Mcgrow Hill, New Delhi.

REFERENCE BOOK
1. WhiteleyDavid, "E- Commerce Strategy, Technologies applications", TMH, New Delhi.
2. TurbanIrfan, Dennis veehland, David King, Joe lee, "E- Commerce – A Managerial Perspective", Pearson Education Asia.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA224
Course title: CLOUD COMPUTING
Pre-requisite(s): Computer Network, Operating System
Co- requisite(s):
Credits: 4   L:3   T:1   P:0
Class schedule per week: 04
Class: BCA
Semester / Level: IV/2
Branch: BCA

Course Objectives
This course enables the students:

A.	To understand software, and other shared resources to be provisioned over the network as services in an on-demand manner.
B.	To understand the cloud computing models.
C.	To understand the different types of cloud computing services namely, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS).
D.	To understand virtualization, security and privacy issues.
E.	To understand Cloud OS, federated clouds.

Course Outcomes
After the completion of this course, students will be able to:

1.	Identify the current practices in cloud computing.
2.	Analyse the challenges in implementing clouds, data centers, hypervisor CPU and memory management
3.	Elaborate cloud hosted applications, and other advanced and research topics in cloud computing
4.	Evaluate the performance and systems issues, capacity planning, disaster recovery.
5.	Summarize the cloud computing facilities and current technologies.

SYLLABUS

Module I :
Cloud Computing at a glance, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Cloud Computing over the Internet.

(8L)

Module II:
Eras of Computing, Elements of Distributed Computing, Concepts of Virtualization and its characteristics, Virtualization and cloud computing, cloud reference model, types of clouds, economics of the cloud.

(8L)

Module III:
Cloud Interoperability and standards:
Amazon Web Services: Compute Services, Storage Services, Communication Services. Google AppEngine: Architectural and Core Concepts, Application Life-Cycle, Cost Model.
Microsoft Azure: Azure Core Concepts, SQL Azure.

(8L)

Module IV:
Energy-Efficiency in clouds, Energy-Efficient and Green Cloud Computing Architecture, Market-Oriented Cloud Computing, Federated clouds: characterization and definition, cloud federation stack.
Cloud Security and Trust Management: Cloud Security Defense Strategies.

(8L)

Module V :
Application of clouds in: Health care, Biology, CRM, ERP, Social Networking, Productivity and Geoscience. Cloudlets for Mobile Cloud Computing.

(8L)

TEXT BOOK
1. BuyyaRajkumar, Charles, VecchiolaChristian amd SelviS. Thamarai "Mastering Cloud Computing", McGraw Hill Education(India) Private Limited, 2013.

REFERENCE BOOK
1. HwangKai, FoxGeoffrey C., DongarraJack J., "Distributed and Cloud Computing from Parallel Processing to the Internet of Things", Morgan Kaufmann - India Edition, 2012.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA270
Course title: FUZZY LOGIC AND APPLICATIONS
Pre-requisite(s):
Co- requisite(s): None
Credits: 4   L: 3   T: 1   P: 0
Class schedule per week: 4
Class: BCA
Semester / Level: IV/2
Branch: BCA

Course Objectives

This course enables the students:

1.	To understand the concept of fuzzy logic and controllers
2.	To understand the various architectures of ANN and its learning methods
3.	To learn about basic concepts of genetic algorithm and its operators
4.	To understand the Artificial Neural Networks
5.	To understand the Genetic Algorithms

Course Outcomes

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

1.	Solve numerical on Fuzzy sets and Fuzzy Reasoning.
2.	Develop Fuzzy Inference System (FIS).
3.	Solve problems on Genetic Algorithms
4.	Explain concepts of neural networks
5.	Develop neural networks models for various applications.

SYLLABUS

Module I :
Fuzzy Set Theory: Basic Definition and Terminology, Set Theoretic Operations, Fuzzy types and levels, MF Formulation and Parameterization, MF of two dimensions, Fuzzy Union, Intersection and Complement, Fuzzy Number,Fuzzy measure,

(8 L)

Module II:
Fuzzy Logic: Fuzzy Rules and Fuzzy Reasoning:Extension Principles and Fuzzy Relations, Fuzzy IF THEN Rules, Defuzzification,FuzzyReasoning.Fuzzy Inference System: Introduction, Mamdani Fuzzy Models, Other Variants, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models.

(8 L)

Module III:
Fundamentals of Genetic Algorithms: Basic Concepts, Creation of Offsprings, Encoding, Fitness Functions, Reproduction, Genetic Modelling: Inheritance Operators, Cross over, Inversion and detection, Mutation operator, Bitwise operators.

(8L)

Module IV:
Introduction to Artificial Neural Networks: What is a Neural Network? Human Brain, Models of Neuron, Neural Network viewed as Directed Graphs, Feedback, Network Architecture, Knowledge Representation, Learning processes:(Error correction, Memory-Based, Hebbian ,Competitive,Boltzman ,Supervised,Unsupervised),Memory,Adaptation.

(8L)

Module V:
Perceptrons, Adaline, Back Propagation Algorithm, Methods of Speeding, Convolution Networks, Radical Basis Function Networks, Covers Theorem, Interpolation Learning, The Hopfield Network.

(8L)

TEXT BOOKS
1. Jang J.S.R., Sun C.T. and Mizutani E., "Neuro-Fuzzy and Soft Computing" PHI/Pearson Education, New Delhi, 2004.
2. Rajasekaran S. & Vijayalakshmi, G.A. Pai, "Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications", PHI, New Delhi, 2003.
3. Ross T. J., "Fuzzy Logic with Engineering Applications", TMH, New York, 1997.
4. Haykins Simon, "Neural Networks:A Comprehensive Foundation", Pearson Education,2002.

REFERENCE BOOKS
1. Ray K.S., "Soft Computing and Its application", Vol 1, Apple Academic Press.2015.
2. Lee K.H., "First Course on Fuzzy Theory and App.", Adv in Soft Computing Spinger.2005.
3. Zimmermann H.Z., "Fuzzy Set Theory and its App", 4thEdition, Spinger Science,2001.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA271
Course title: FUZZY LOGIC AND APPLICATIONS LAB
Pre-requisite(s):
Co- requisite(s): None
Credits: 4   L: 3   T: 1   P: 0
Class schedule per week: 4
Class: BCA
Semester / Level: IV/2
Branch: BCA

Course Objectives

This course enables the students:

1.	To understand the concept of fuzzy logic and controllers
2.	To understand the various architectures of ANN and its learning methods
3.	To learn about basic concepts of genetic algorithm and its operators
4.	To understand the Artificial Neural Networks
5.	To understand the Genetic Algorithms

Course Outcomes

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

1.	Solve numerical on Fuzzy sets and Fuzzy Reasoning.
2.	Develop Fuzzy Inference System (FIS).
3.	Solve problems on Genetic Algorithms
4.	Explain concepts of neural networks
5.	Develop neural networks models for various applications.

SYLLABUS

1. To perform Union,Intersection and Complementoperations.
2. Implementation of Fuzzy Relations (Max-min Composition)
3. To implement De-Morgan's Law
4. To plot various membership functions
5. To implement FIS Editor.
6. Implementation of Fuzzy Controller (Washing Machine)
7. Implementation of Perceptron Learning Algorithm
8. Implementation of Unsupervised Learning Algorithm
9. Implementation of Simple Genetic Application

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA257
Course title: WEB PROGRAMMING LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L:0   T:0   P:2
Class schedule per week: 04
Semester / Level: IV/2
Class: BCA

Course Objectives

This course enables the students:

A.	To learn about basics of web programming
B.	Learn HTML, Java Script, XML for scripting
C.	Learn web based programming using ASP.NET
D.	Learn PHP based programming
E.	Learn Making static and dynamic websites

Course Outcomes

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

1.	Know the fundamentals of web programming
2.	Identify .NET technology and framework
3.	Elaborate on the web based programming
4.	Perform web based programming.
5.	Design static and dynamic websites

SYLLABUS

1. India is a large country. Different regions observe variations in climate. The spoken language of one state is quite different from that of another. They wear different types of garments. They celebrate different festivals and perform varied religious rites. People belonging to diverse cultures belong to different religious faiths. In spite of these diversities, Indians feel a sense of unity and oneness among them. Thus, we conclude that India is a land of Unity in Diversity.
   a) All the headings should be H2 and green colour.
   b) Main heading should be H1 and centre aligned.
   c) The background should be yellow colour.
   d) There are 10 paragraphs so each of them should be made using P tag.
   e) The Introduction and Conclusion paragraphs should have "Times New Roman" font, the size should be 12 and colour should be blue.
   f) All the remaining paragraphs text should be pink and magenta coloured in an alternate way.
   g) There should be one meaningful picture in the web page with specific dimension.
2. Create a webpage having a list as shown below:

   - **Food**
     a. Fruit
        - Apple
        - Mango
        - Pear
     b. Vegetable
        - Potato
        - Tomato
        - Carrot
   - **Dress**
     a. Ethnic wear
        - Kurta
        - Sherwani
     b. Western wear
        - suit
        - jeans
   - **Sports**
     a. Indoor sports
        - carom
        - table tennis
     b. Outdoor sports
        - Cricket
        - Hockey
3. Create a webpage with the following:

   a) A superscript and subscript tag
   b) Pre tag
   c) Paragraph tag
   d) Anchor tag
   e) Image tag

f) Definition list tag
g) Marquee tag
h) Horizontal line tag
i) Break tag
j) Heading tag

4. Create a webpage having 10 divisions each having separate background color and text color using <DIV> tag. At the top right corner there should be an image hyperlink opening in a new webpage.

5. Create a webpage with a form loaded into it and take input of three strings through three textboxes and then concatenate them without using any built-in function.

6. Create a webpage with two tables. First one should have 1 row and 5 columns and the second one with 3 rows and 4 columns. The contents of the first table should be center aligned and contents of the second table should be right aligned. Each column of the first table should have separate colors and each row of the second table should have separate colors.

7. Write a JavaScript program to calculate and display the aggregate and percentage of three subjects' (Physics, Chemistry and Mathematics) marks along with the name of a student. The name and individual marks input shall be taken by textbox in the webpage.

8. Write a JavaScript program to search the element 4 in the array [2, 6, 4, 10, 4, 0, -2] using any method.
9. Create a framed webpage with different frames as below:

1	2	3
4		5
6	7	8

Contents of 1st, 3rd, 5th, 7th frame should be same again 2nd, 4th, 6th and 8th should be same.

4. Create a webpage to take input of a string and check whether it is a palindrome or not.
5. Write a program using JavaScript to display a structure as given below:

```
      *
     * *
    * * *
   * * * *
  * * * * *
```

6. Write a program using JavaScript to take input of an array of numbers like [-4, 5, 6, -1, 10] and then sort it in descending order.
7. Create a webpage to take input of a string and reverse that without using any user defined function.
8. Write a JavaScript program to search 10 in the array [2, 6, -5, 10, 11, 0, -2] using a binary search method.
9. Write a JavaScript program to take two arrays like [3, 7, 1, 6, 2, 3] and [5, 6, 0, -3] and merge them into third array along with that remove the repetitive elements.
10. Write a JavaScript program to calculate the percentage of three subjects' (English, Mathematics, and Science) marks along with the name of a student. The name and individual marks input shall be taken by form in the webpage.
11. Create a webpage to take input of a string and count the number of vowels in it.
12. Create a webpage to take input of two strings and concatenate them without using any built-in function.
13. Create a webpage to take input of a string and then slice it into three separate strings and display that.
14. Write a JavaScript program to take two arrays like [1, 3, 8, 1, 6, 2, 3] and [2, 1, 5, 6, 0, -3] and merge them into third array along with that remove the repetitive elements.
15. Write a JavaScript program to calculate and display the aggregate and percentage of three subjects' (Physics, Chemistry and Mathematics) marks along with the name of a student. The name and individual marks input shall be taken by textbox in the webpage.
16. Create a webpage to take input of a string and check whether it is a palindrome or not.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA259
Course title: SOFTWARE ENGINEERING LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L:0   T:0   P:2
Class schedule per week: 04
Class: BCA

Course Objectives

This course enables the students:

A.	To understand the concept of UML
B.	To gain knowledge of various diagrams.
C.	Learn about software requirement specification.
D.	To gain knowledge about software design specification.
E.	To learn about the relationships among different UML diagrams.

Course Outcomes

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

CO1.	Identify the software requirement capturing process.
CO2.	Elaborate knowledge about dynamic view of system.
CO3.	Analyse about static view of software system.
CO4.	Analysis about the relationship among static and dynamic view of system.
CO5.	Identify the process of deployment of software system.

SYLLABUS

List of Programs as Assignments:

1. Draw use case diagram for online banking system.
2. Draw use case diagram for online library system
3. Draw use case diagram for online railway reservation system
4. Draw use case diagram for employee information system.
5. Draw use case diagram for inventory control system
6. Draw use case diagram for student information system.
7. Draw use case diagram for online hotel management system.
8. Draw use case diagram for online bus reservation system.
9. Draw use case diagram for online course registration system
10. Draw use case diagram for online teacher information system.
11. Draw sequence diagram for online banking system.
12. Draw sequence diagram for online library system.
13. Draw sequence diagram for online railway reservation system.
14. Draw sequence diagram for employee information system.
15. Draw sequence diagram for inventory control system.
16.. Draw sequence diagram for student information system.
17. Draw sequence diagram for online hotel management system.
18. Draw sequence diagram for online bus reservation system.
19. Draw sequence diagram for online course registration system.
20. Draw sequence diagram for online teacher information system.
21. Draw activity diagram for online banking system.
22. Draw activity diagram for online library system.
23. Draw activity diagram for online railway reservation system.
24. Draw activity diagram for employee information system.
25. Draw activity diagram for inventory control system.
26.. Draw activity diagram for student information system.
27. Draw activity diagram for online hotel management system.
28. Draw activity diagram for online bus reservation system.
29. Draw activity diagram for online course registration system
30. Draw activity diagram for online teacher information system.
31. Draw class diagram for online banking system.
32. Draw class diagram for online library system
33. Draw class diagram for online railway reservation system
34. Draw class diagram for employee information system.
35. Draw class diagram for inventory control system
36.. Draw class diagram for student information system.
37. Draw class diagram for online hotel management system.
38. Draw class diagram for online bus reservation system.
39. Draw class diagram for online course registration system .

40. Draw class diagram for online teacher information system.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA301
Course title: COMPUTER GRAPHICS AND MULTIMEDIA
Pre-requisite(s):
Co- requisite(s): Computer Graphics Lab.
Credits: 3   L:3   T:0   P: 0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: BCA

Course Objectives

This course enables the students to:

A.	Acquire fundamental knowledge of role of multimedia and graphics in computer science.
B.	Learn various object modelling algorithms and computations related to it.
C.	Learn to model and colour 2D and 3D objects
D.	Learn to develop simple Graphical User Interface
E.	Learn about graphics system and corresponding display methodologies.

Course Outcomes

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

1.	Can perform visual computations for geometrical drawings.
2.	Can model 2D objects.
3.	Apply geometrical transformation of the modelled objects.
4.	Can develop simple Graphical User Interface.
5.	Design multimedia applications

SYLLABUS

Module I:
Introduction to Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Graphics Monitors and Workstations, Input Devices, Hard Copy Devices, Graphics Software. Three-Dimensional Viewing Devices, Stereoscopic & Virtual Reality Systems

(8L)

Module II:
Output Primitives: Points and Lines, Line Drawing Algorithms (DDA and Bresenham's Algorithms), Loading the Frame Buffer, Circle Generating Algorithm, Filled Area Primitives – Scan-line Polygon Fill Algorithm, Boundary-Fill Algorithm, Flood-Fill Algorithm, Color Tables.

(8L)

Module III:
2D Transformation and Viewing: Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations (Translations, Rotations, Scalings), Other Transformations (Reflection and Shear), The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Clipping- Point, Cohen-Sutherland Line Clipping and Sutherland-Hodgeman Polygon Clipping.

(8L)

Module IV:
Three-Dimensional Geometric Transformations: Translation, Rotation, Scaling.

(8L)

Module V:
Introduction to Multimedia Systems and Multimedia Components: Multimedia Systems, Multimedia Presentation and Production, Characteristics of Multimedia Presentation, Uses of Multimedia. CD Formats, DVD, DVD Formats. Text and its File Formats, Image Types and File Formats, Fundamental Characteristics of Sound, Audio File Formats, Video, Transmission of Video Signals, Video File Formats. (8L)

TEXT BOOKS
1. HearnD. and BakerM. P., "Computer Graphics: C Version", 2nd Edition, Pearson Education, 2007.
2. BufordJ. F. K., "Multimedia Systems", 1st Edition, Pearson Education, 2005.

REFERENCE BOOKS
1. FoleyJ. D., DamA. Van, Feiner S. K. and HughesJ. F., "Computer Graphics: Principles and Practice in C", 2nd Edition, Pearson Education, 2000.
2. ParekhR., "Principles of Multimedia", 2nd Edition, Tata McGraw Hill, 2012.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: CA303
Course title: COMPUTER NETWORKS
Pre-requisite(s):
Co- requisite(s):
Credits: 3   L:3   T:0   P: 0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: BCA

Course Objectives

This course enables the students:

A.	To build an understanding of the fundamental concepts of the data communication model and communications architecture.
B.	To study characteristics of communication mediums and the characteristics of signals propagated through different transmission media, including concepts of transmission impairments.
C.	To understand the basic principles of signal encoding techniques, error-detection, and error-correction techniques.
D.	To understand techniques for flow control and multiplexing for maximum utilization of bandwidths in the data communications process.
E.	To understand the various switching techniques and routing techniques for efficient transmission.

Course Outcomes

After the completion of this course, students will be:

1.	Understand and be able to explain the principles of a layered protocol architecture; be able to identify and describe the system functions in the correct protocol layer and further describe how the layers interact.
2.	Understand, explain and calculate digital transmission over different types of communication media.
3.	Understand, explain and solve mathematical problems for data-link and network protocols.
4.	Describe the principles of access control to shared media and perform performance calculations.
5.	Understand and explain the principles and protocols for route calculations and be able to perform such calculations.

SYLLABUS

Module I: [
Network: Needs and **Adv**antages, Network Hardware, Network software, Classification of Networks: LAN, MAN, WAN, Network Topology: Bus, Star, Ring, Star bus, Star ring, Mesh – Features, Advantages and disadvantages of each type.

(8L)

Module II :
Transmission Media: Wired & Wireless transmission, properties & speciality of various media, **ConnectivityDevices**: Modem, Repeater, NIC, Network adapters, Connectors, Transceiver, Hub, Bridge, Switches, Routers and Gateways,
Network Architecture: Layering and Design, OSI Reference Model, TCP/IP Model, SNA

(8L)

Module III:
Physical Layer: Functions and Services, Interface: EIA 232 D Interface, DTE/DCE Interface, Null Modem, Physical Layer Standard. Multiplexing: FDM & TDM

(8L)

Module IV:
Data Link Layer: Functions, Error control: Error Detection and Correction Techniques), Flow Control: Stop and Wait & Sliding Window Flow controls. Protocols: HDLC.
Network Layer: Need and Services, Internetworking Principles, Internet Protocol(IPv4), Routing, Congestion Control.

(8L)

Module V:
Local Area Network: Ethernet, Fast Ethernet, Token Rings, FDDI, ATM, IEEE 802 standards: 802.3, 802.4, 802.5
Network Security: Network security issues, approaches to network security, hacking. Firewalls: types of firewall technology- network level and application level, limitations of firewalls. Encryption and Decryption (Basic concepts)

(8L)

TEXT BOOK
1. TanenbaumAndrew S, "Computer Networks", Pearson Education, New Delhi.

REFERENCE BOOKS
1. ComerD E, "Computer Networks and Internet", 2nd Edition, Pearson Education, New   Delhi.
2. GuptaPrakash C, "Data Communication & Computer Networks", PHI, New Delhi.
3. Forouzan B., "Data Communications and Networking", 3rd edition, Tata McGraw-Hill Publications.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

Course code: CA304
Course title: MANAGEMENT INFORMATION SYSTEMS
Pre-requisite(s):
Co- requisite(s):
Credits: 3   L: 3   T: 0   P: 0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: BCA

Course Objectives:
This course enables the students:

A.	To know the role of Information Systems in Business Today.
B.	To know what is an Information System.
C.	To understand how Businesses Use Information Systems:
D.	To know the basics of Information Systems, Organizations, and Strategy.
E.	To know the basics of Information Technology and Computers uses in Management Information Systems.

Course Outcomes:
After the completion of this course, students will be able to:

1.	Identify the role of Information Systems in Business Today.
2.	Analyse what is an Information System.
3.	Assess Information Systems, Organizations, and Strategy.
4.	Elaborate on the uses Computers and IT in Management Information Systems.
5.	Apply the impacts of MIS in Business Decision Makings.

SYLLABUS

Module I:
Information Systems in Global Business Today:
The role of Information System in Business Today, How Information Systems Are Transforming Business, What's New in Management Information Systems?, Globalization Challenges and Opportunities: A Flatted World, The Emerging Digital Firm, Strategic Business Objectives of Information Systems, Perspectives on Information Systems, What is an Information System?, Dimensions of Information Systems, It Isn't Just Technology: A Business Perspective on Information Systems. (8L)

Module II:
E-Business: How Businesses Use Information Systems:
Business Processes and Information Systems, Business Processes, How Information Technology Enhances Business Processes, Types of Information Systems, Transaction Processing Systems, Management Information Systems and Decision-Support Systems, Systems That Span the Enterprise, Enterprise Applications, Intranets and Extranets, Collaboration and Communication Systems: "Interaction" Jobs in a Global Economy, E-Business, The Information Systems Function in Business. (8L)

Module III:
Information Systems, Organizations, and Strategy:
Organizations and Information Systems, What Is an Organization?, Features of Organizations, How Information Systems Impact Organizations and Business Firms, Economic Impacts, Organizational and Behavioural Impacts, The Internet and Organizations, Implications for the Design and Understanding of Information Systems, Using Information Systems to Achieve Competitive Advantage, Porter's Competitive Forces Model. (8L)

Module IV:
IT Infrastructure and Emerging Technologies:
IT Infrastructure, Defining IT Infrastructure, Evolution of IT Infrastructure, Technology Drivers of Infrastructure Evolution, Infrastructure Components, Computer Hardware Platforms, Operating System Platforms, Enterprise Software Applications, Data Management and Storage, Networking/ Telecommunication Platforms, Internet Platforms, Consulting and System Integration Services, Contemporary Hardware Platform Trends, The Emerging Mobile Digital Platform, Grid Computing, Cloud Computing and the Computing Utility, Autonomic Computing. (8L)

Module V:
Enhancing Decision Making:
Decision Making and Information Systems, Business Value of Improved Decision Making, Types of Decisions, The Decision Making process, Managers and Decision Making in The Real World, Systems for Decision Support, Management Information System(MIS), Decision-Support Systems(DSS), Web-Based Customer Decision-Support Systems, Group Decision-Support Systems(GDSS), Executive Support Systems(ESS).
Case Studies: Two Recent Case Studies to be Discussed Fully Covering the Whole Syllabus. (8L)

TEXT BOOK
1. Laudon K. and Laudon J.,"Management Information Systems", Prentice Hall Publication.

REFERENCE BOOKS
1. Murdick, Ross and Claggett, "Information Systems for Modern Management", PHI Publication.
2. Jawadekar W. S., "Management Information Systems", Tata McGraw Hill Publication.

3. GoyalD. P., "Management Information Systems Managerial Perspectives", Macmillan India Ltd.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

PROGRAM ELECTIVES -III

COURSE INFORMATION SHEET

Course code: CA272
Course title: DATA ANALYTICS
Pre-requisite(s):
Co- requisite(s): Lab on R
Credits: 4   L: 3   T: 1   P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: V/2
Branch: BCA

Course Objectives
This course enables the students to:

A.	Understand business intelligence and business and data analytics.
B.	Explore different aspects of Big Data Technologies.
C.	Learn the concepts of loop functions and debugging tools.
D.	Know the business data analysis through the powerful tools of data application.
E.	Learn aboutTableau, MapReduce, and get introduced in to R and R+.

Course Outcomes
After the completion of this course, students will be able to:

1.	Illustrate about business intelligence and business and data analytics.
2.	Explore different aspects of Big Data Technologies.
3.	Elaborate the methods of data mining and creation of decision tree.
4.	Implement business data analysis through the powerful tools of data application.
5.	Apply Tableau, MapReduce, and get introduced in to R and R+.

SYLLABUS

Module I:
Analysis using Descriptive and Pictorial Statistics: Mean, median, mode, harmonic mean, geometric mean, variance and standard deviation, quantiles, skewness, moments and kurtosis. Data Visualization: Summery table, Contingency table, Bar plot, Pie chart, Frequency distribution, Relative frequency distribution, Cumulative frequency distribution, Histogram, Frequency polygon, Cumulative frequency graphs, Box plot, Time series plot, Scatter diagram.

(8L)

Module II:
Data Relationships, Transformation, and Data Cleaning: Relationships between different types of data: Relationship between two categorical data, Relationship between categorical and quantitative data, Relationship between two quantitative data Transformation: The logarithm transformation, Root and square root transformation Standardization (Z-transformation), Min-max normalization. Data cleaning: missing values, noisy data.

(8L)

Module III:
Analysis using Inferential Statistics: Sampling, Sampling Distribution, and Estimation of Parameters, Sampling distribution of: means, proportions, difference of means, difference of proportions. Hypothesis testing about: population mean, the difference between two means, about a population proportion, difference between two proportions.

(8L)

Module IV:
Social Network and Text Data Analysis: What is a social network? Characteristics of social network. Link mining: Tasks and challenges. Mining on social networks. Text data analysis and informational retrieval. Dimensional reduction for text.

(8L)

Module V:
Outlier Analysis: Outlier detection based on: statistical distribution, distance based, deviation based.

(8L)

TEXT BOOK
1. HanJ and KamberM, "Data Mining: Concepts and techniques", Morgan Kaufmann Publishers.
2. Gupta and Gupta, "Business Statistics", Sultan Chand and Sons, 2014.

REFERENCE BOOK
1. MaheshwariAnil, "Data Analytics", Mc Graw hill publication, 2017.
2. TanPang-Ning, SteinbachMichael, and KumarVipin, "Introduction to Data Mining, Pearson Education", New Delhi.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA275
Course title: ANDROID PROGRAMMING
Pre-requisite(s): Computer Network, Operating System
Co- requisite(s):
Credits: 4   L:3   T:1   P:0
Class schedule per week: 04
Class: BCA
Semester / Level: V/2
Branch: BCA

Course Objectives
This course enables the students:

1.	Develop app for digital devices.
2.	Learn real time app.
3.	Apply skill on real time applications.
4.	Understand the logic and challenges of Android programming.
5.	Integrate Java and android to develop game and applications for different industries.

Course Outcomes
After the completion of this course, students will be able to:

1.	Define app requirements for digital devices.
2.	Classify the constraints in developing real time app.
3.	Apply skill on real time applications.
4.	Evaluate the logic and challenges of Android programming.
5.	Develop and Integrate Java and android to develop game and applications for different industries.

SYLLABUS

Module I:
What is Android? Android EcoSystem, Features of Android, Architecture of Android, Android Verson,Android SDK, Android Development tools, Anatomy of an Android Application.

(8L)

Module II :
Android User Interface: Linear Layout, Absolute Layout, Frame Layout, Relative Layout, Table Layout.

(8L)

Module III:
Designing User Interface with View: Text View, Push Button, Image Button, Edit Text, Checkbox, ToggleButton, Radio Button, ProgressBar, Spinner, List View, Gridview, Time and Date Picker.

(8L)

Module IV:
Displaying Pictures and Menus with Views: Gallery Views,ImageSwitcher, GridView, Options Menu, Context Menu, DigitalClock View, Webview.
SMS Messaging: Sending SMS Messages Programmatically.

(8L)

Module V:
SQLITE Database in Android: SQLite Database, Creation and connection of the database, extracting values from a curser.

(8L)

TEXT BOOK
1. DixitPrashant Kumar, "Android", Vikas Publishing House Pvt. Ltd, 1stEdition, 2014.

REFERENCE BOOK
1. LeeWei-Meng, "Beginning Android for Application Development", Wiley, Indian Edition.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA273
Course title: R LANGUAGE
Pre-requisite(s): C/C++
Co- requisite(s): R Lab
Credits: 4   L:3   T:1   P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: V/2
Branch: BCA
Name of Teacher:

Course Objectives

This course enables the students:

A.	To know details about the R Language.
B.	Understand Applications, advantages and limitations of various data types.
C.	Real life use of R Language.
D.	Doing projects on R.
E.	Use R as a tool to develop latest know-how related to the subject.

Course Outcomes

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

1.	Define basic concepts of R programming.
2.	Classify features of R programming and skills.
3.	Apply the knowledge gained for their project work as well as to develop some statistical applications.
4.	Implement R for statistical analysis applications
5.	Design R based projects

SYLLABUS

Module I:
Introduction: Why R? What Is R? Why Use R for Your Statistical Work? Getting Started How to Run R, Interactive Mode, Running R in Batch Mode, a Short Programming Example, Preview of Some Important R Data Structures, Vectors, Matrices, Lists, Data Frames.

(8L)

Module II:
Vectors: Scalars, Vectors, Arrays and Matrices. Vector Arithmetic and Logical Operations. Vector Indexing. Vector Element Names. Elementwise Operations on Vectors. Vectorized Functions, The Case of Vector-Valued Functions. Elementwise Operations in Nonfactorizable Settings. Filtering. Combining Elementwise Operations and Filtering, with the ifelse() Function.

(8L)

Module III :
Matrices: General Operations. Matrix Indexing. Matrix Row and Column Mean Functions. Matrix Row and Column Names. Adding/Deleting Elements of Vectors and Matrices. Filtering on Matrices. Applying the Same Function to All Rows or Columns of a Matrix. The apply() Function. The sapply() Function. Digging a Little Deeper on the Vector/Matrix Distinction.
Lists: List Creation. List Tags and Values, and the unlist() Function. Issues of Mode Precedence. Accessing List Elements. Adding/Deleting List Elements. Indexing of Lists. Applying the Same Function to All Elements of a List. Size of a List. Recursive Lists.
Data Frames: Matrix-Like Operations. rowMeans() and colMeans(), rbind() and cbind(). Indexing, Filtering and apply().Creating a New Data Frame from Scratch. Converting a List to a Data Frame. Factors and Tables

(8L)

Module IV:
R Programming Structures: Arithmetic and Boolean Operators and Values. Type Conversions. R Functions. Functions Are Objects. Return Values. Functions Have (Almost) No Side Effects. Locals, Globals and Arguments. Writing to Globals Using the Super assignment Operator. Strategy in Dealing with Lack of Pointers. Default Values for Arguments. Functions Defined Within Functions.

(8L)

Module V:
Input/Output: Reading from the Keyboard. Printing to the Screen. Reading a Matrix or Data Frame from a File. Reading a File One Line at a Time. Writing to a File. Writing a Table to a File. Writing to a Text File Using cat(). Writing a List to a File. Writing to a File One Line at a Time. Directories, Access Permissions, Etc.

(8L)

TEXT BOOK
1. MatloffNorman, "The Art of R Programming – A Tour of Statistical Software Design", No Starch Press, San Francisco, CA 94103, 2011.

REFERENCE BOOKS
1. GardenerMark, "Beginning R: The Statistical Programming Language", John wiley & Sons Inc. 2012.
2. PengRoger D., "R Programming for Data Science", Leanpub, 2015.
3. GrolemundGarrett, "Hands-On Programming with R", O'Reilly Media, Inc., 2014.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA320
Course title: Software Testing
Pre-requisite(s): Knowledge of software engineering
Co- requisite(s):
Credits: 03   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: BCA

Course Objectives
This course enables the students:

A.	Have a broad understanding of software requirements in context to end user expectations.
B.	Familiarize with testing environments and test processes.
C.	Describe to the students the impact and methods to overcome programming errors
D.	Devise strategies to detect and rectify common programming errors.
E.	Conceptualize the role of testing in estimating software quality.

Course Outcomes
After the completion of this course, students will be:

1.	Understand the types and effects of errors and bugs on a software and the testing process.
2.	Apply testing strategies to detect software bugs.
3.	Analyse approaches of verification and validation including static analysis, and reviews as well as software testing approaches such as unit testing and integration testing.
4.	Evaluate the software quality and apply test suites like JUnit and selenium for testing software.
5.	Summarize best practices for coding to ensure good quality software, quality products by applying quality metrics

SYLLABUS

Module I:
Introduction:Software Testing – Psychology of Testing, Verification and Validation, Testing Team and Development Team, Characteristics of Test Engineers, Levels of Testing Principles of Software Testing, Error, Fault, Failure, Incident, Error and Fault Taxonomies, Test Cases, Limitations of Testing Codeinspections, desk checking, group walkthroughs and peer reviews. Overview of Graph Theory for tester.

(8L)

Module II:
Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision TableBased Testing, Cause Effect Graphing Technique. Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, DataFlow Testing, Slice based testing

(8L)

Module III:
Testing Activities: Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Regression Testing, Extreme Testing.

(8L)

Module IV:
Object Oriented Testing: Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing. Testing Internet applications: Overview, challenges and strategies of testing internet applications.

(8L)

Module V:
Overview of Testing Tools – Need for Automated Testing Tools, Taxonomy of Testing Tools, Functional/Regression Testing Tools, Performance Testing Tools, Testing Management Tools, Source Code Testing Tools, How to select a Testing Tool. WinRunner – Overview of WinRunner, Testing Applications using WinRunner.

(8L)

TEXT BOOKS
1. JorgensenPaul C., "Software Testing- A Craftsman's Approach", Second Edition, CRC Press, 2008.
2. Ammann Paul and OffuttJeff, "Introduction to Software Testing", Cambridge University Press, Cambridge, UK, ISBN 0-52188-038-1, 2008.

REFERENCE BOOKS
1. TamresLouise, "Software Testing", Pearson Education Asia, 2002.
2. PressmanRoger S., "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
3. AggarwalK.K. & SinghYogesh, "Software Engineering", New Age International Publishers, New Delhi, 2003
4. TamresLauise, "Introducing Software Testing", Pearson Education

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA322
Course title: NETWORK SECURITY
Pre-requisite(s):
Co- requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: V/3
Branch: BCA
Name of Teacher:

Course Objectives

This course enables the students:

1.	Able to understand the fundamentals of security algorithms currently
2.	Able to understand E-mail security, PEM& S/MIME, PGP, Firewalls.
3.	Have a broad knowledge of the state-of-the-art and open problems in network security
4.	Enhance their potential to do research or pursue a career in this rapidly developing area.
5.	Able to be introduced to new developing security features.

Course Outcomes

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

1.	Identify state-of-the-art and open problems in network security
2.	Analyse all relevant aspects of security in networks like E-mail security, PEM& S/MIME, PGP, Firewalls.
3.	Assess the impact of Modes of Operation and problems in network
4.	Summarise developing security features in networking systems and Real time communication security
5.	Design of secure system and applications

SYLLABUS

Module I:
Introduction to networking: OSI Reference model, Active vs Passive attacks, Layers and cryptography, Multilevel model of security.

(8L)

Module II:
Modes of Operation: encrypting large messages, Generating MAC's, Multiple Encryption DES, Hash and message digest: Using Hash for encrypting, MD2, MD4, MD5, SHA1.

(8L)

Module III:
Authentication Systems, Password authentication systems, authentication protocols, tructed intermediates, session key establishment.
Security handshake pitfalls: mutual authentication, Integrity / encryption of data, mediated authentication, strong password protocols.

(8L)

Module IV:
Real time communication security: Session key establishment, perfect forward secrecy, DOS, clogging protection, Arranging for parallel computation, session resumption, data steam protection, plausible deniability.

(8L)

Module V:
E mail security, PEM& S/MIME, PGP, Firewalls.

(8L)

TEXT BOOK
1. Kaufman Charlie, Perlman Radia and Speciner Mike, "Network Security: Private Communication in a Public World", 2nd Edition, Prentice Hall, 2002.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA302
Course title: COMPUTER GRAPHICS LAB
Pre-requisite(s):
Co- requisite(s): Problem Solving and Programming in C
Credits: L: 0 T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students:

1.	To learn computer graphics by practical
2.	To Learn coding for various graphics tools.
3.	To learn the various theory by implementation using programming
4.	To identify the limitations of C Language for graphics related problem.
5.	To know the practical application of computer graphics.

Course Outcomes

After the completion of this course, students will be able:

CO1	To code programs efficiently.
CO2	To translate the graphics algorithm to programs.
CO3	To test and execute the graphical syntax and logical errors.
CO4	To apply programming to solve simple graphical problems using functions.
CO5	To write the C program efficiently for transformation problems.

SYLLABUS

list of programs as assignments:

write programs using *c language*

1. To get the background color.
2. To set the background color.
3. To plot a point of co-ordinate (100,100).
4. To draw a line using the line function.
5. To draw a line using the line function. take the end co-ordinates from the user.
6. To draw a triangle using the polygon function.
7. To draw a polygon of 'n' edges using polygon function.
8. To draw a polygon of 'n' edges taken from the user using the polygon function.
9. To draw a circle using the circle function.
10. To draw a circle of radius 'r' taken from the user using the circle function.
11. To draw a line using dda algorithm.
12. To draw a line using bresenham's line algorithm.
13. To draw a circle using midpoint circle algorithm.
14. To draw a line using bresenham's line algo, where end points are taken from the user.
15. To draw a line using dda algo, where end points are taken from the user.
16. To draw 'n' concentric circles taken from user using midpoint algorithm.
17. To create a line and translate it.
18. To create a line and increase its size with a value taken from user.
19. To create an equilateral triangle.
20. To draw a line and rotate it with angle of 45.
21. To create a circle and translate it.
22. To create a circle and translate it with a value taken from user.
23. To create an equilateral triangle and rotate it with angle of 45.
24. To create an equilateral triangle and create reflection.
25. To scale a rectangle.
26. To shear a rectangle. take the shear factor from the user.
27. To create an equilateral triangle and translate, rotate and scale it.
28. To draw a line with shear and translation.
29. Draw bar chart.
30. Draw pie chart.

Books recommended:

TEXT BOOK

1. Roger T. Stevens, Advanced Graphics Programming in C and C++, BPB Publication
2. Donald Hearn, M. Pauline Baker, Computer Graphics, C Version, Prentice Hall Publication
3. https://www.programmingsimplified.com/c/graphics.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
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CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA274
Course title: R language LAB
Pre-requisite(s):
Co- requisite(s): Credits: 2 L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: V/2
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

1.	To learn statistical and numerical computing
2.	To Learn coding for interpreter.
3.	To learn the problem-solving process statistical and probability related problem.
4.	To identify the limitations of R Language.
5.	To know the practical application of R Language.

Course Outcomes

After the completion of this course, students will be able:

CO1	To code interpreted programs.
CO2	To translate the mathematics to programs.
CO3	To test and execute the interpreted language and correct syntax and logical errors.
CO4	To apply programming to solve simple statistical problems using functions.
CO5	To write the program efficiently.

SYLLABUS

List of Programs as Assignments:

1. Select 5 random numbers which are chosen with and without replacement from the integer 0, 1, 2,…, 100.
2. Write a function to implement combination and permutations.
3. Display the "Birla Institute of Technology" by inputting via keyboard.
4. Display the "Birla Institute of Technology" by inputting from file.
5. Suppose $x = (x_1, x_2,..., x_n)$, and $y = (y_1, y_2,..., y_n)$.

Create the vector $(y_2 - x_1, y_3 - x_2,..., y_n - x_{n-1})$.

6. Create the vectors (a) (1, 4, 8 ,…, 20), (b) (1, 2, 3, …, 9, 8, 7, 6, …, 1).
7. Create the following vectors: (1, 2, 3, 4 1, 2 , 3, 4, … , 1, 2, 3, 4) (repeat 1, 2, 3, 4:5 times).
8. Display all the data present in {1,2,3,4,5,6,7,8,9} except 5 using continue statement.
9. Calculate maximum, minimum, mean, summation, mean using inbuilt R function.
10. Calculate trimmed mean, weighted mean of a data {2,4,8,9}.
11. Identify geometric and harmonic mean of the data {3,2,1}.
12. Calculate range, standard deviation, and variation of the data {4, 5, 7, 8}.
13. Suppose x = (1, 2, 3, 4, … , 20), print the values which are more than 15. What are the index positions in x of the values which are less than 12?
14. Suppose Data = {1, 2, 3, … , 25}.
(a) How many values in Data are within 8?
(b) How many numbers in Data are divisible by 3?
(c) Sort the Data in decreasing order.
(d) Pick out the elements from the Data at index positions 1, 10, 15, and 20.

15.
$$Z = \begin{bmatrix} 1 & 2 & 1 \\ 1 & 2 & 2 \\ 1 & 2 & 3 \end{bmatrix}$$
(a) Replace the third column of Z by the sum of the second and third columns.
(b) Calculate $Z^T * Z$. (c) Find the number of entries in each row which are greater than or equal to 2.
16. Now write a function FUN1 which takes 2 arguments x and n where x is a single number and n is

a strictly positive integer. The function should return the value of $1 + \dfrac{x}{1!} + \dfrac{x^2}{2!} + ... + \dfrac{x^n}{n!}$.

17. Calculate the following:

(a) $\displaystyle\sum_{a=1}^{10} (a^2 + a^3 / 2)$ 　　　　(b) $\displaystyle\sum_{a=1}^{10} (\dfrac{a^a}{10} + 2^a / a^3)$

18 Write a program in R to generate quadratic values.
19. Pasting two vectors "BIT" and "Mesra".
20. Apply matrix multiplication and addition of two large matrices and calculate elapsed time.
21. Write a function to count the number of odd numbers present in its argument vector.

22. Write a program to implement maximum of three numbers using if else statement (without using inbuilt function).

23. The following is the age distribution of 1000 persons working in a Kolkata based software company, named Mechatronics. Calculate (a) mean, (b) median, (c) mode, (d) variance, (e) standard deviation, (f) skewness, and (g) kurtosis using "gds" function downloaded from R-CRAN.

Age group	NP	Age group	NP	Age group	NP
20-25	10	35-40	300	50-55	30
25-30	140	40-45	200	55-60	10
30-35	200	45-50	100	60-65	10

NP: Number of person

24. Table stores centuries of two legendary cricketers Sir Isaac Vivian Alexander Richards (Sir Viv), and Mr. Sunil Manohar Gavaskar (little master). Display (i) frequency distribution, (ii) relative frequency distribution, (iii) cumulative relative frequency distribution, (iv) histogram, (v) frequency polygon, (vi) cumulative frequency polygon, (vii) box plot of runs of these two great cricketers.

R	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1
U	9	0	4	3	7	3	3	9	4	4	2	8	1	0	2	7	1	0	0	1	0	2	4	1
N	2	1	2	0	7	2	5	1	0	5	0	2	4	9	0	8	7	8	5	0	9	3	6	0
S	W	L	W	D	L	D	W	W	D	D	D	W	D	D	D	W	W	D	W	W	W	D	W	W

(a) Centuries by Sir Isaac Vivian Alexander Richards

R	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
U	1	1	2	2	0	1	5	0	1	0	1	2	1	1	3	0	0	8	2	2	1	2	6	7	5	2	4	0	2	3	6	7	0
N	6	7	4	0	1	6	6	2	9	8	3	7	8	1	7	5	7	2	0	1	5	3	6	2	5	7	7	3	1	6	6	2	3
S	D	D	D	D	L	W	D	W	W	D	L	L	W	L	L	D	D	D	D	D	D	W	W	D	D	D	D	D	D	D	D	D	D

(b) Centuries by Little Master Sunil Manohar Gavaskar,   S: status, W: won, L: Lost, D: Draw

Table 3.33 Cricket centuries by two legendary cricket players

25. Construct a simple time series plot for the following data {1, 2, 3, 5, 10, 30, 25, 40, 45, 46, 49, 50, 55, 57, 59, 60, 54, 70, 65, 68, 70, 89, 75, 90, 93, 88, 99} which are the cost of item X.

26. Check whether following data X is normally distributed or not using q-q plot. X = {1, 3, 5, 10, 30, 40, 45, 46, 49, 50, 55, 57, 59, 60, 70, 89, 99}.

27. Construct a scatter plot for the following data {1, 2, 3, 5, 10, 30, 25, 40, 45, 46, 49, 50, 55, 57, 59, 60, 54, 70, 65, 68, 70, 89, 75, 90, 93, 88, 99}.

28. A sample of 8 students participated in a psychological study designed to assess the relationship between average television watching (in minutes) (ATW) per day and mathematics marks (out of 100) (Marks) of eighth grade students. The results obtained are shown in the following table (Table 4.12):

Students	1	2	3	4	5	6	7	8
ATW	30	45	60	90	35	110	33	55
Marks	60	55	40	45	90	40	76	80

ATW: Average television watching, Marks: Mathematics marks

Questions: Using R

1. Calculate sample covariance in between ATW and Marks.
2. Calculate Karl Pearson's coefficient of correlation.
3. Calculate Spearman's rank correlation coefficient.
4. Calculate Kendall's τ -a (tau) correlation coefficient.

29. Fit a straight line by the method of least squares to the following data. Using R estimate the weight when height is 175 cm.

Height	165	170	179	180	185	187	190	191	195	196
Weight	72	76	87	89	77	84	89	98	90	90

30. Suppose we have mathematics marks of forty students as follows: 20, 25, 31, 37, 39, 42, 45, 48, 56, 58, 59, 59, 60, 61, 61, 63, 63, 64, 64, 64, 65, 65, 67, 68, 68, 69, 69, 70, 72, 73, 74, 74, 76, 77, 79, 80, 84, 89, 90, 94. Construct stem-and-leaf display.

Books recommended:

TEXT BOOK
1. Garrett Grolemund, Hands-On Programming with R, O'Reilly.
2. Norman Matloff, ,The art of rprogrammingA Tour of StatisticalSoftware Design, No Starch Press.
3. Roger D. Peng, R Programming for Data Science, Lean Publishing.

REFERENCE BOOK
1. Emmanuel Paradis, R for Beginners, Emmanuel Paradis.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA321
Course title: SOFTWARE TESTING LAB
Pre-requisite(s):
Co- requisite(s): Credits: 2 L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: BCA
Name of Teacher:

Course Objectives

This course enables the students:

A.	Have a broad understanding of software requirements in context to end user expectations.
B.	Familiarize with testing environments and test processes.
C.	Describe to the students the impact and methods to overcome programming errors
D.	Devise strategies to detect and rectify common programming errors.
E.	Conceptualize the role of testing in estimating software quality.

Course Outcomes

After the completion of this course, students will be:

1.	Understand the types and effects of errors and bugs on a software and the testing process.
2.	Apply testing strategies to detect software bugs.
3.	Analyse approaches of verification and validation including static analysis, and reviews as well as software testing approaches such as unit testing and integration testing.
4.	Evaluate the software quality and apply test suites like JUnit and selenium for testing software.
5.	Summarize best practices for coding to ensure good quality software, quality products by applying quality metrics

SYLLABUS

List of Programs as Assignments:

1.   Why testing is required?
2.   What are the types of testing?
3.   What is difference between Verification and Validation?
4.   Explain Principles of Software Testing.
5.   What are Test Cases?
6.   Overview of Graph Theory for tester.
7.   Explain Boundary Value Analysis with example.
8.   Explain Equivalence Class Testing with example.
9.   Explain Decision Table Based Testing with example.
10.   Explain Cause Effect Graphing Technique with example.
11.   Explain Path testing with example.
12.   Explain Cyclomatic Complexity with example.
13.   What are Graph Metrics?
14.   Explain Dataflow Testing with example.
15.   Explain Slice based testing with example.
16.   What are Testing Activities?
17.   What are Levels of Testing?
18.   Explain Integration Testing.
19.   What is System Testing?
20.   What is Regression Testing?
21.   What is Extreme Testing?
22.   What is Debugging?
23.   Discuss the challenges and strategies of testing internet applications
24.   What do you understand the Automation Testing Approach ?
25.   Write and test a program to login a specific web page
26.   Write and test a program to update 10 student records into table into Excel file
27.   Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects).

28.   Write and test a program to provide total number of objects present / available on the page.

29.   Write and test a program to get the number of list items in a list / combo box.
30.   Write and test a program to count number of items present on a desktop
31.   Give an overview of WinRunner, Note down the Testing Applications using WinRunner.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA355
Course title: DATA MINING
Pre-requisite(s): Programming concept/ Probability and statistics
Co- requisite(s):
Credits: 3   L:3   T:0   P: 0
Class schedule per week: 03
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives

This course enables the students to:

1.	Understand the need of data mining activities.
2.	ntify the methods of pre-processing data and performing activates related to ETL.
3.	Know the various applications of data mining.
4.	To familiarize the concepts of Data mining
5.	To decide what data mining activities are required to obtain the desired objectives.

Course Outcomes

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

1.	Identify data mining related applications and activities
2.	Assess the problem and decide what data mining activities are required to obtain thedesired objectives.
3.	Mathematically perform pre-processing operations on datasets to ensure the validity of the data is improved.
4.	Analyse and evaluate algorithms for performing common data mining
5.	Apply Data mining methods for performance and optimization issues

SYLLABUS

Module I:
Introduction: What is data mining? Motivating challenges. The origins of data mining. Data mining tasks. Data: Types of Data. Attributes and Measurement. Types of Data Sets. Data Quality Measurement and Data Collection Issues.

(8L)

Measures of Similarity and Dissimilarity: Basics. Similarity and Dissimilarity between Simple Attributes. Dissimilarities between Data Objects. Similarities between Data Objects. Examples of Proximity Measures. Issues in Proximity Calculation. Selecting the Right Proximity Measure.

(8L)

Module III:
Association Analysis: Basic Concepts and Algorithms Preliminaries. Frequent Itemset Generation. The Apriori Principle. Frequent Itemset Generation in the Apriori Algorithm. Candidate Generation and Pruning Support Counting. Rule Generation.

(8L)

Module IV :
Cluster Analysis: Basic Concepts and Algorithms. What Is Cluster Analysis? Different Types of Clustering. Different Types of Clusters. K-means. Basic K-means Algorithm. Basic Agglomerative Hierarchical Clustering Algorithm. Key Issues in Hierarchical Clustering. The DBSCAN Algorithm.

(8L)

Module V:
Classification: Basic Concepts and Techniques. General Framework for Classification. Decision Tree Classifier. A Basic Algorithm to Build a Decision Tree. Methods for Expressing Attribute Test Conditions. Measures for Selecting an Attribute Test Condition. Algorithm for Decision Tree Induction. Characteristics of Decision Tree Classifiers. Model Evaluation.

(8L)

TEXT BOOK
1. Tan Pang-Ning, Steinbach Michael, andKumar Vipin , "Introduction to Data Mining", Pearson Education, New Delhi.

REFERENCE BOOKS
1. Han Jiawei & Kamber Micheline, "Data Mining Concepts & Techniques", Publisher Harcourt India. Private Limited, Second Edition
2. Dunham H.M. & Sridhar S., "Data Mining", Pearson Education, New Delhi, 2006.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA356
Course title: DISTRIBUTED COMPUTING
Pre-requisite(s): Computer Network, Operating System
Co- requisite(s):
Credits: 3   L:3   T:0   P:0
Class schedule per week: 03
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives

This course enables the students to:

A.	Know about Different forms of Computing.
B.	UnderstandInterprocess Communications.
C.	Learn and understand Distributed Computing Paradigms.
D.	Know about The Client Server Paradigm.
E.	Implement Distributed Objects.

Course Outcomes

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

1.	Justify the presence of concurrency within the framework of distributed system.
2.	Explain the range of requirements that modern distributed systems have to address.
3.	Describe how the resources in a parallel and distributed system are managed by software
4.	Understand the memory hierarchy and cost-performance trade-offs.
5.	Explain what virtualization is and how it is realized in hardware and software.

SYLLABUS

Module I :
Distributed Computing Concept: Definitions, The history of distributed computing, Different forms of computing, The strengths & weaknesses of distributed computing, Basics of operating systems, Network basics, Software engineering basics. Event synchronization, Timeouts and threading, Deadlocks, Data representation, Data marshalling, Event diagram and sequence diagram, IPv4 & IPv6, Connection – oriented versus connectionless IPC. (8L)

Module II :
Distributed Computing Paradigms: Paradigms and Abstraction, Message Passing, The Client-Server Paradigm, the Message System Paradigm, Remote Procedure Call Model, RMI, The Distributed Objects Paradigm, The Object space, The Mobile Agent Paradigm.   (8L)

Module III :
The Socket API: The Socket metaphor in IPC, The Datagram Socket API, The Stream-Mode Socket API, Sockets with nonblocking I/O Operations, Secure Socket API.
The client server paradigm issuers, connection- oriented and connectionless servers, Iterative server and concurrent server, stateful server and stateless server.   (8L)

Module IV :
Distributed Objects: Remote Procedure Calls, Distributed Objected Systems, Remote Method Invocation, The Java RMI Architecture, The API for the Java RMI, RMI Security Manager, Comparison of RMI
Remote Procedure Calls, Distributed Objected Systems, Remote Method Invocation, The Java RMI Architecture, The API for the Java RMI, RMI Security Manager, Comparison of RMI and Socket APIs.
                                                                                                        (8L)

Module V :
Group Communication: Unicasting versus Multicasting, Multicast API, Connectionless versus Connection-oriented Multicast, Reliable Multicasting versus Unreliable Multicasting, The Java Basic Multicast API.   (8L)

TEXT BOOK
1. Liu M. L., "Distributed Computing: Principles and Application", Pearson Education, 2008.

REFERENCE BOOK
1. AltiyaH., WelchJ., "Distributed Computing Fundamentals, Simulations and Advanced Topics", 2nd edition, Wiley – India Edition, 2006.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

PROGRAM ELECTIVE –V

COURSE INFORMATION SHEET

Course code: CA323
Course title: CYBER FORENSICS
Pre-requisite(s):
Co- requisite(s):
Credits: 4   L:3   T:1   P:0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA
Name of Teacher:

Course Objectives
This course enables the students:

A.	Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
B.	Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes
C.	Knowledge on digital forensics legislations, digital crime, forensics processes andprocedures, data acquisition and validation, e-discovery tools.
D.	E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics.

Course Outcomes
After the completion of this course, students will be able to:

1.	Understand relevant legislation and codes of ethics.
2.	Apply Computer forensics and digital detective and various processes, policies and procedures.
3.	Understand E-discovery, guidelines and standards, E-evidence, tools and environment.
4.	Learn the techniques ofEmail and web forensics and network forensics tools.
5.	Integrate techniques to recover data from computer and hand held devices.

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SYLLABUS

Module I :
IPsec protocols - IP Authentication header - IP ESP, Key management protocol for IPsec, Transport layer Security: SSL protocol, Cryptography computations - TLS protocol   (8L)

Module II :
PGP - S/ MIME: Internet Firewalls for Trusted System: Roles of Firewalls - firewall related terminology, Types of Firewalls, Firewall design, Honeycomb design: Set for E-Commerce transactions
(8L)

Module III :
Introduction to traditional cybercrime, Traditional problems associated with cybercrime, Introduction to Identity Theft & Identity Fraud, Types of Cyber Forensics techniques: incident & incident response methodology, Forensics duplication & investigations, Preparation of IR: Creating response tool kit & IR team, Forensics Technology & Systems   (8L)

Module IV :
Processing Crime & Incident Scenes, Working with windows & DOS systems, Current computer Forensics tools: Software/ hardware tools   (8L)

Module V :
Validating Forensics data, Data hiding techniques, Performing Remote Acquisition, Network Forensics, Email investigations, Cell phone & Mobile devices Forensics   (8L)

TEXT BOOK
1. Albert J. Marcella Jr., & Frederic Guillossou, "Cyber Forensics: From Data to Digital Evidence", John Wiley and Sons, ISBN-13: 978-1118273661, 2012.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
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Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA325
Course title: UNIX AND SHELL PROGRAMMING
Pre-requisite(s):
Co- requisite(s):
Credits: 4   L: 3   T: 1   P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives:
This course enables the students:

A.	To understand concept of an Operating System.
B.	Understand Applications and Features on Unix/Linux.
C.	Understand the process in Linux.
D.	Using shell as a programming language.
E.	At Working with System Calls and Interrupts.

Course Outcomes
After the completion of this course, students will be able to:

1.	Understanding the design of Linux kernel components
2.	Experiencing the kernel by passive/active observation
3.	Extending the Linux kernel for understanding, self-satisfaction/falsification.
4.	Exploring current research trends in OS, Linux being the reference OS
5.	Understanding the design of Linux kernel components

SYLLABUS

Module I :
Introduction to Unix: Introduction to operating system, Introduction to Unix, Application of Unix, History of Unix, Features of Unix, Typical Unix Based systems, Login and Logout procedure, Introductory commands date, cal, banner, writer, mesg, who, passwd.
Files and Directories: Unix Architecture, kernel, shell, Utilities, Unix file system, Unix files, type of files,File naming conventions. Unix Directories, Basic commands for working with Directories pwd,mkdir,cd, ls, Metacharacters and wildcard, rmdir.
File Manipulations: File security and Ownership issues, Type of access to files / directories, Determining file access permission, changing the access chmod, chown,chgrp, File management utilities of Unix (8L)

Module II :
Input Output Redirection and Filters: Input/output redirection in UNIX, Input redirection, Output redirection, standard error redirection. Pipes and Filters. Working with Vim Editor.
Introduction to Processes: Processes in Unix, Manipulation of processes, Running processes in the background, Terminating processes. (8L)

Module III :
Shell Programming - i: Features of the shell, shell as a Programming Language, Creating and executing a shell script, shell variables, Command substitution, Local and Global variables, Conditional execution Operators.
Shell Programming – ii: Iteration construct, The case… esac Construct.Parameters to shell scripts. Shifting the parameters, Listing the shell variables, Creating User define functions. (8L)

Module IV :
Positioning the Cursor: tput, Interrupt handling. The awk Utility: The awk Utility, The awk program structure, Processing Records, Logical Operators, Special Patterns, Action statements, Print statements. Control flow statements, String and numberic functions in awk. System calls for Low Level Input / Output. File descriptor, File I: Open, read, write and close. (8L)

Module V :
File Creation: Create, Random access: Iseek, Change directoy: chdir, Determining and changing file access, access system call, chmod system call, chown system call.
Status of files: stat, fstat. Linking and unlinking files: link, unlink. System calls for process management: Introduction, Context of a process, Execution of Processes: exec (8L)

TEXT BOOK
1. MichaelRandal K., "Mastering Unix Shell Scripting", 2nd Edition, Wiley publication.

REFERENCE BOOK
1. VenkateshmurthyM.G., "Introduction to Unix and Shell Programming", Paperback, Pearson. 2005.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA326
Course title: UNIX AND SHELL PROGRAMMING LAB
Pre-requisite(s):
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives:
This course enables the students:

F.	To understand concept of an Operating System.
G.	Understand Applications and Features on Unix/Linux.
H.	Understand the process in Linux.
I.	Using shell as a programming language.
J.	At Working with System Calls and Interrupts.

Course Outcomes
After the completion of this course, students will be able to:

1.	Understanding the design of Linux kernel components
2.	Experiencing the kernel by passive/active observation
3.	Extending the Linux kernel for understanding, self-satisfaction/falsification.
4.	Exploring current research trends in OS, Linux being the reference OS
5.	Understanding the design of Linux kernel components

SYLLABUS

List of assignments:

Assignment 1

1. Create two files source.txt and dest.txt using vi editor which contains some text and practice the following commands on that files. cat, tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join,tee, pg, comm, cmp, diff,cp, mv, ln, rm, unlink, tty, script, clear, date, cal, mkdir, rmdir, du, df, find, umask, ps,who, w.E

Assignment 2

1. Write a C program to check whether the given string is palindrome or not using Command line substitution.
2. Write a C program to emulate the UNIX ls-l command.
3. Write a C program to check the given integer is prime or not.
4. Write a C program to display Largest of three numbers.
5. Write a C program to check whether the given number is Avogadro number or not.
6. Write a C program to find the Factorial of a given number.
7. Write a C program that accept two integers as its arguments and computes the value of first number raised to the power of second number.

Assignment 3

1. Write a shell script that accepts a file name,starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that takes a command line argument and reports on whether it is directory, a file, or something else.
4. Write a shell script that accepts one or more file names as arguments and converts all of them to uppercase, provided they exist in the current directory.

Assignment 4

1. Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
2. Write a shell script that takes a login name and reports when that person logs in c)Write a shell script to read two file names and it should check whether the two file contents are same or not. If they are same then second file should be deleted.

Assignment 5

1. Simulate Uniq command using C.
2. Simulate grep command using C.

Assignment 6

1. Write a C program that takes one or more file or directory names as input and reports the following information on the file: i)File type ii)Number of links iii)Read, write and execute permissionsiv)Time of last access(Note : Use stat/fstat system calls)

Assignment 7

1. Write a C Program to display Environment variables.b)Write a C Program to implement Different types of exec functions.Exercise 8a)Write a Program to handle the Signals like SIGINT, SIGQUIT, and SIGFPE.
2. Write a Program to create a Zombie Process.c)Create a Process using fork() and display Child and Parent Process Id's.

Assignment 8

1. Write a shell script program to display the process attributes.
2. Write a shell script to change the priority of processes.
3. Write a shell script to change the ownership of processes.
4. Write a program to send back a process from foreground.
5. Write a program to retrieve a process from background.
6. Write a program to create a Zombie process.
7. Write a program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	1	2	2	2	1
CO2	3	2	3	3	3	3	2	1
CO3	2	2	2	1	2	2	1	1
CO4	3	1	2	3	1	2	3	1
CO5	1	1	1	1	3	1	2	1

< 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1, CD2
CD2	Tutorials/Assignments	CO2	CD1, CD2
CD3	Seminars	CO3	CD1, CD2
CD4	Mini projects/Projects	CO4	CD1, CD2
CD5	Laboratory experiments/teaching aids	CO5	CD1, CD2
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

COURSE INFORMATION SHEET
Course code: CA327
Course title: SYSTEM PROGRAMMING
Pre-requisite(s):
Co- requisite(s): None
Credits: 4   L: 3   T: 1   P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives
This course enables the students:

A.	Describe the utility of different system programs & system tools.
B.	Familiarize with the trade-offs between run-time and compile-time processing (Linking & Loading techniques).
C.	To learn the concepts and techniques behind the designing of various system software.
D.	To organize the functionalities & components of system software & tools into different layers for efficient code generation.
E.	Understand the designing of text editors, debuggers etc.

Course Outcomes
After the completion of this course, students will be:

1.	Elaborate the evolution of various system software.
2.	Define various data structures that helps in the proper functioning of the system programs.
3.	Analyse basic design of various system software.
4.	Apply functionalities & components of system software & tools into different layers for efficient code generation.
5.	Development and designing of text editors, debuggers etc.

SYLLABUS

Module I :
Introduction: Evolution of the Components of a Programming System, Assemblers, Loaders, Macros, Compilers, Linkers, Overview of Machine Language.

(8L)

Module II :
Instruction Addressing and Execution: Evolution of Operating Systems, Features of an Operating System, The BIOS Boot Process, The System Program Loader, Stack, Instruction Execution and Addressing, Instruction operands, protected Mode.

(8L)

Module III :
Assemblers: Overview of Assembly Language, Assembly Language Features, Conventional Segment Directives, Assembly Process, Single Pass Assembler, Design of a 2-Pass assembler for 8088.

(8L)

Module IV:
Macros & Macro Processors: Macros, Different forms of Macros, Macros using AIF, AGO, REPT. Etc., Design of a Macro Processor, Macro Assembler.
Loaders: Basic Loader Functions, Absolute Loader, Compile & go Loader, Relocating Loader, Direct Linking Loader.

(8L)

Module V:
Linkage Editors: Linking and Relocation, Program Relocatability, Linkage Editor and its Application in IBP-PC, Linking for Program Overlays.
Software Tools: Spectrum of Software Tools, Text Editors, Interpreter and Program Generators, Debug Monitors, Programming Environments.

(8L)

TEXT BOOK
1. DhamdhereD.M., "System Programming and Operating Systems", 2nd Edition., TMH, New Delhi.

REFERENCE BOOKS
1. AbelPeter, "IBM PC Assembly Language and Programming", 5th Edition, PHI, New Delhi-2003.
2. DonovanJ.J., "System Programming", TMH, New Delhi.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSEINFORMATION SHEET

Course code: CA328
Course title: DISTRIBUTED DATABASE SYSTEMS
Pre-requisite(s):
Co- requisite(s): None
Credits: 4   L: 3   T: 1   P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives

This course enables the students to:

1.	Introduce principles and foundations of distributed databases
2.	Learn concepts related to architecture, design issues, integrity control, query processing
3.	Understand the concept of a database transaction and related database facilities, including concurrency control, backup and recovery
4.	How to interpret the modeling symbols for the most popular ER modeling tools. And real-world database design which often involves conflicting goals.
5.	Know the role of the database administrator and data object locking and protocols in distributed databases

Course Outcomes

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

1.	Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
2.	Design and implement a small distributed database project
3.	Interpret the modeling symbols for the most popular ER modeling tools in context to real-world database design which often involves conflicting goals.
4.	Describe and discuss selected advanced database topics like the data warehouse.
5.	Apply optimization, transactions, and concurrency control in distributed environment.

SYLLABUS

Module I:
Introduction: Distributed Data Processing, What is a Distributed Database System? Promises of DDBSs, Problem Areas.

(8L)

Module II:
Distributed DBMS Architecture: DBMS Standardization, Architectural Models for Distributed DBMSs, Distributed DBMS Architecture.
Distributed Database Design: Alternative Design Strategies, Distribution Design Issues, Fragmentation, Allocation.

(8L)

Module III:
Overview of Query Processing: Query Processing Problem, Objectives of Query Processing, Complexity of Relational Algebra Operations, Layers of Query Processing.
Query Decomposition and Optimization: Query Decomposition, Query Optimization, Centralized Query Optimization, Distributed Query Optimization Algorithms.

(8L)

Module IV:
Transaction Management and Concurrency Control: Definition of a Transaction, properties of Transactions, Serializability Theory, Taxonomy of Concurrency Control Mechanisms, Locking-based Concurrency Control Algorithms, Timestamp-based Concurrency Control Algorithms, Deadlock Management.

(8L)

Module V:
Distributed DBMS Reliability: Reliability Concepts and Measures, Failures and Fault Tolerance in Distributed Systems, Failures in Distributed DBMS, Local Reliability Protocols, Distributed Reliability Protocols.

(8L)

TEXT BOOK
1. OzsuM. Tamer, ValduriezPatrick, "Distributed Database Systems", 2nd Edition, Pearson, 2011.

REFERENCE BOOKS
1. NavatheElmasri, "Fundamental of Database Systems", 5th Edition, Pearson Education, 2008.
2. ConnollyThomas, BeggCarolyn, "Database Systems – A Practical Approach to Design, implementation and Management", 4th Edition, Pearson Education, 2008.
3. Silberschatz, Korth, &Sudarshan, "Database System Concepts", 4th Edition, McGraw Hill, 2002.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA331
Course title: DECISION SUPPORT SYSTEM
Pre-requisite(s):
Co- requisite(s): None
Credits: 4   L: 3   T: 1   P: 0
Class schedule per week: 04
Class: BCA
Semester / Level: VI/3
Branch: BCA

Course Objectives

This course enables the students:

A.	To understand the basic components of DSS
B.	To learn different phases and models for Decision making
C.	To understand how to create a distributed database using fragmentation.
D.	To learn transaction processing in a distributed environment.
E.	To understand how concurrency control is performed in a distributed environment.

Course Outcomes

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

1.	Discuss the basic components of DSS
2.	Classify the different phases and models for Decision making
3.	Design a DSS according to the requirements.
4.	Model and develop different levels in DSS using Software engineering principles
5.	Analyse the system with pros and cons.

SYLLABUS

Module I:
Introduction to DSS: Definition. Types of DSS. Data and Model Management. DSS Knowledge Base. User interface. The DSS user. Categories and classes of DSS.

(8L)

Module II:
Decision and Decision-makers: Definition. Types of decision. Different levels of Decision makers in the organization and their requirement. Decision effectiveness. Simon's model of decision making. Rational decision making. Bounded rationality. Biases and heuristics in decision making.

(8L)

Module III:
Group Decision Support System (GDSS): Group decision making. GDSS modeling. Brainstorming process. MDM support technologies. Managing MDM activities.
System perspective of a DSS: DSS in the context of information system. Information quality issues in DSS design. Role of internet in DSS development.

(8L)

Module IV:
Designing and building DSS: Strategies for DSS analysis and design. The DSS developer. Tools for DSS development.
Implementing and Integrating DSS: DSS implementation. System evaluation. The importance of integration.

(8L)

Module V:
Intelligent Decision Support system: The intelligence of Artificial Intelligence. Future of Expert and Artificial Intelligence. Knowledge acquisition for Expert Systems. Future of Intelligent Software Agents and Delegation.

(8L)

TEXT BOOKS
1. MarakasGeorge M., "Decision Support Systems in the 21st century", Pearson education.

REFERENCE BOOKS
1. TurbanEfraim, **"Decision Support Systems and Intelligent Systems"**, Pearson Education.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	1	2	2
CO2	3	1	1	1	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

PROGRAM ELECTIVE (SEC-IV)

COURSE INFORMATION SHEET
Course code: CA380
Course title: TALLY SOFTWARE (ACCOUNTING AND FINANCETALLY ERP)
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives
This course enables the students to:

A	Able to understand the basic concepts of TALLY
B	Learn the advantages of TALLY
C	To understand the structure of TALLY
D	To know the applications of TALLY IN accounting
E	To understand the difference between TALLY with other language

Course Outcomes

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

1	Able to write a TALLY program
2	Able to solve real-time problem using TALLY
3	Able to analyse any logical and numerical problems using TALLY
4	Able to create a function using TALLY
5	Able to create an accounting software.

SYLLABUS

1. How would you create a computer in Tally.
2. How would you create a Ledger, Group in Tally.
3. How would you display ,alter & delete the Ledger.
4. Describe the process of entering Vouchers
5. Contra, Payment, Receipt, Journal, Sales, Purchase.
6. How would you display ,alter & delete the Vouchers
7. Describe the various options of reports
8. Day Books Cash and Bank & Ledgers Books
9. How would you display Trail Balance, Profit & Loss Statement.
10. Balance Sheet in columns and rows.
11. How would you cost categories with cost centers in tally
12. Various options in tally shortcut or Function Key
13. Various options printing reports in Tally.
14. Understand by cash flow and fund flow in tally
15. Describe the Accounts with Inventory company in Tally
16. Create a Stock, Stock Unit & Alternate units, Stock Group & Stock Item
17. Describe the sales voucher, Sales invoice and purchase invoice.
18. How would you display stock group and stock item.
19. How would you sales & purchase with tax Auto calculation
20. Sales bill with auto discount calculation
21. Employee payroll in tally.
22. How would you delete a company, Modify company.

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
   1. Student Feedback on Faculty
   2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	1	3	2	2
CO2	3	1	1	3	1	3	1	1
CO3	2	3	3	1	2	1	2	2
CO4	1	1	3	2	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course code: CA381
Course title: PHOTO SHOP LAB
Co- requisite(s):
Credits: 2   L: 0   T: 0   P: 2
Class schedule per week: 04
Class: BCA
Semester / Level: V/3
Branch: Bachelor of Computer Applications
Name of Teacher:

Course Objectives

This course enables the students to:

A	Able to understand the basic concepts of Photo Shop
B	Learn the advantages of Photo Shop
C	To understand the structure of Photo Shop
D	To know the applications of Photo Shop
E	To understand the difference between Photo Shop with other related softwares

Course Outcomes

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

1	Able to analyze any photo using Photo Shop
2	Able to apply use layer masks, filters and blending modes
3	Able to create, edit and work with text
4	Able to Design layouts for web pages, Paper Adverts, Brouchers, CD Covers, Package Designing
5	Able to create new layers and perform other basic layer functions

SYLLABUS

1. Interface Photoshop and workspace, Document setup width height & resolution.

2. What are the kinds of Tools in the toolbox? (Tool Palette and Interface - The Tool Palette - Painting and Editing - Custom Brushes)

3. Using selection tools, transform, marquee, crop, lesso, magic wand, eraser etc.(Basic Photo Corrections - Rotating, Scaling, and Distorting with Transformations - Feathering and Info Palette - Understand Resolution - Touch up Tools)

4. What are foreground and background colors?

5. How do you change the size of a picture?

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment					
Semester End Examination					

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Course Delivery Methods

CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Assignments/Seminars
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Industrial visits/in-plant training
CD6	Self- learning such as use of NPTEL materials and internets
CD7	Simulation

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MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	3	2	2	1	2	2
CO2	3	2	1	1	1	3	1	1
CO3	1	3	3	1	1	1	2	2
CO4	1	1	3	3	1	1	1	1
CO5	3	3	3	1	2	1	1	2

If satisfying and < 34% = 1, 34-66% = 2, > 66% = 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1,CD6
CO2	CD1, CD6,CD7
CO3	CD1, CD2, CD3,
CO4	CD1, CD3,CD6,CD7
CO5	CD1,CD2,CD7

COURSE INFORMATION SHEET

Course Code : CA360 PROJECT