BIRLA INSTITUTE OF TECHNOLOGY MESRA

RANCHI, INDIA

CHOICE BASED CURRICULUM

Computer Science and Engineering

U.G. Programme

(Bachelor of Computer Applications)

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)

PEO 1: To excel in software development skills coveted in the IT industry.

PEO 2: 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.

PEO 4: To inculcate the ability to innovate and contribute towards the growth of the nation.

Programme Outcomes(POs)

PO 1: Attain problem solving attitude in systematic and timely manner.

PO 2: Apply knowledge of mathematics, algorithm and computing principles appropriately to solve real-world problems.

PO 3: Identify modern tools and techniques through critical thinking for solving complex problems.

PO 4: Use the computational resources efficiently to develop software for the industry need.

PO 5: Understand and assess societal, environmental, safety, legal and ethical norms for professional computing practices.

PO 6: Function as an individual or as a member in team in the software domain.

PO 7: Recognize the need for self-motivation, learning and unlearning to engage in life-long learning for continual development.

PO 8: 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", 5th Edition, TMH, 2010. **(T1)**
2. Sprankle M., "Problem Solving and Programming Concepts", 7th Edition, 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 Evaluation:

Individual assignment, Theory (Quiz and End semester) examinations

Gaps in the syllabus (to meet Industry/Profession requirements):

Design of real-time industrial projects.

POs met through Gaps in the Syllabus:

Topics beyond syllabus/Advanced topics/Design:

Design optimization for industrial projects, Fractional order controller

POs met through Topics beyond syllabus/Advanced topics/Design:

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.

(8L)

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", 3rd Edition, McGraw-Hill, London, 2000. **(R2)**

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

Course Evaluation:
Individual assignment, Theory (Quiz and End semester) examinations

Gaps in the syllabus (to meet Industry/Profession requirements):
Design of real-time industrial projects.
POs met through Gaps in the Syllabus:

Topics beyond syllabus/Advanced topics/Design:
Design optimization for industrial projects, Fractional order controller
POs met through Topics beyond syllabus/Advanced topics/Design:

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 & Pushp Lata, 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)**

Course Evaluation:
Individual assignment, Theory (Quiz and End semester) examinations
Gaps in the syllabus (to meet Industry/Profession requirements):
Design of real-time industrial projects.
POs met through Gaps in the Syllabus:

Topics beyond syllabus/Advanced topics/Design:
Design optimization for industrial projects, Fractional order controller
POs met through Topics beyond syllabus/Advanced topics/Design:

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

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

Individual assignment, Theory (Quiz and End semester) examinations

Gaps in the syllabus (to meet Industry/Profession requirements):

Design of real-time industrial projects.

POs met through Gaps in the Syllabus:

Topics beyond syllabus/Advanced topics/Design:

Design optimization for industrial projects, Fractional order controller

POs met through Topics beyond syllabus/Advanced topics/Design:

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAM OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2			1	1	
CO2	2		1			2		1
CO3	3		2	2	2		1	
CO4	2	1	1		2	2		
CO5	3	2		1	1	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. Das H. K., "Advanced Engineering Mathematics", S. Chand, 2009. **(T3)**

REFERENCE BOOK

1. Kolman B., Busby R. C., and Ross S. C., "Discrete Mathematical Structures", 6th Edition, Prentice Hall of India, 2008. **(R1)**
2. Sheth H., "Abstract Algebra", PHI, 2009. **(R2)**
3. Grewal B. S., "Higher Engineering Mathematics", Khanna Publishers, 2000. **(R3)**

Course Evaluation:
Individual assignment, Theory (Quiz and End semester) examinations

Gaps in the syllabus (to meet Industry/Profession requirements):
Design of real-time industrial projects.
POs met through Gaps in the Syllabus:

Topics beyond syllabus/Advanced topics/Design:
Design optimization for industrial projects, Fractional order controller
POs met through Topics beyond syllabus/Advanced topics/Design:

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 sinx = $x - x^3/3! + x^5/3! - x^7/7!$ ….. 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", Pearson 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 Evaluation:

Day to day progressive evaluation, Lab Quizzes, Surprise Tests, Online Lab performance and Viva Voce

Gaps in the syllabus (to meet Industry/Profession requirements):

Implementing of real world problems

POs met through Gaps in the Syllabus:

Topics beyond syllabus/Advanced topics/Design:

POs met through Topics beyond syllabus/Advanced topics/Design: Teaching through research papers.

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	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

PROGRAM ELECTIVE (SEC - I)

COURSE INFORMATION SHEET

Course code: CA350
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 about computer based editing tools.
2.	To understand the functioning of operating systems.
3.	To learn the document editing process through computer.
4.	To know preparation of presentations through computers.
5.	To know the practical application of various tools available in MS-office package.

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

CO1	To Apply editing tools for document structuring.
CO2	To translate the data into interpretable sheets
CO3	To Apply formulae and other tools for analysing data.
CO4	To Design Presentations and worksheets
CO5	To implement features of MS-Office in document processing and outlay.

SYLLABUS

Module I:

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)

Module III:

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)

Books recommended:

TEXT BOOK

1. Joyce Cox and Joan Preppernau, "Step by Step Office publisher", Microsoft press, 2008. **(T1)**

REFERENCE BOOK

2. Lisa A. Bucki and John Walkenbach, "Office 2013 Bible: The Comprehensive Tutorial, John Wiley and Sons, 2013. **(R1)**

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