Department of Computer Science and Business Systems

INTRODUCTION TO COMPUTER SCIENCE AND BUSINESS SYSTEMS
30241101

COURSE OBJECTIVES

- To provide the basic understanding of computer hardware, software, and their interaction within systems.
- To present the basics and difference of Data, Information and knowledge.
- To understand the role of business systems and their role in supporting business functions like operations, finance, marketing, and HR.

Unit I

Overview of Computer Systems: Architecture and Components, Hardware Components: CPU, Memory, Storage Devices, I/O Devices, Peripherals, Software: System Software (Operating Systems), Application Software, Programming Languages, Introduction to Operating Systems: Types, Functions, Examples (Windows, Linux, MacOS).

Unit II

Data and its Sources: Data vs Information vs Knowledge, Sources of Data Generation, **Type of Data:** Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time, **Data Types:** Categorical/Nominal/Ordinal, Data Types Conversion, Knowledge Discovery through Data.

Unit III

Overview of the Data Analytics Lifecycle: Data Collection, Storage, Processing, Analysis, **Types of Data Repositories:** Data Warehouse, Pattern Data Warehouse etc. Basics of Machine Learning Models: Supervised and Unsupervised Learning, Case Studies of Data-Driven Business Decisions in Industries like Retail, Finance, Healthcare.

Unit IV

Introduction to Business Systems: Organizational Structure (Functional, Divisional, Matrix), Business Functions (Operations, Marketing, Finance, Human Resources), Business Processes (Supply Chain, Customer Relationship Management), Introduction to Business Economics and Finance, **Overview of Financial Markets:** Stock Market, Bonds, Mutual Funds, and their Role in Business. **Technology in Business:** Impact of

Technology on Business Operations (Efficiency, Productivity, Innovation), Information Systems and their Role in Decision-Making, Ethical Considerations in Technology use (Privacy, Security, Intellectual Property).

Unit V

Introduction to Marketing: Definition, Functions, Importance in Business, **Marketing Mix:** Product, Price, Place, Promotion, **Market Research:** Understanding Consumer Behavior and Trends, **Basics of Digital Marketing:** Social Media, SEO, Email Marketing, **Introduction to Entrepreneurship:** Traits, Challenges, Opportunities, Case Studies of Successful Entrepreneurs and Startups.

RECOMMENDED BOOKS

1. "Operating Systems: Internals and Design Principles" by William Stallings.
2. "Computer System Architecture" by M. Morris Mano.
3. "Principles of Management" by Stephen P. Robbins and Mary Coulter.
4. “Data Mining Concepts and Techniques” Han & Kamber.
5. “Fundamentals of Financial Management" by James C. Van Horne.
6. "Marketing Management" by Philip Kotler.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain the fundamental components and architecture of computer systems.
CO2. discuss the basic marketing concepts and their application in real-world business.
CO3. compare various types of software and their roles in computer systems.
CO4. perform data type conversions to ensure compatibility for analysis
CO5. analyze data to make informed business decisions using analytics platforms

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Department of Computer Science and Business Systems

COMPUTER PROGRAMMING
30241102

COURSE OBJECTIVES

- To develop ability to write a computer program to solve specified problems.
- To develop skills in algorithmic problem-solving, expressed in a programming language like C++.
- To understand fundamentals of programming such as variables, conditional and iterative statement, function and its execution etc.

Unit I

Introduction to Programming: Machine Level Languages, Assembly Level Languages, High Level Languages, Program, Program Execution & Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C++ Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II

Control Statements and Decision Making: The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do…while loop, The for loop, The nesting of for loops, The break and continue statement.

Unit III

Arrays, Strings & Pointers: One Dimensional Array, 2D array, Passing Array to Functions, Multidimensional Array, Strings, Basics of Pointers & Addresses, type of pointers, Application of pointers, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings.

Unit IV

Functions & Structures: Function, Function Prototypes, Passing Parameter by Value and by Reference, Passing String & Array to Function, Function Returning Address, Recursion, Structures, Dynamic Memory Allocation by Call of Function, Storage Classes.

Unit V

File Handling: Defining and Opening a File, Closing Files, Input/output Operations on

Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments, Preprocessor Directives, Formatted I/O.

RECOMMENDED BOOKS

1. E. Balagurusamy, "Programming in ANSI C++", Sevenths Edition, Tata McGraw Hill, 2017.
2. Reema Thareja, "Programming in C++", Second Edition, Oxford publication, 2016.
3. W. Kernighan and Dennis M. Ritchie, "The C/C++ Programming Language", Pearson, 2015.
4. Matthias Felleisen, Robert Bruce Findler, Mathew Flatt, Shriram Krishnamurthi, "How to Design Programs: An Introduction to Programming and Computing", Second Edition, MIT Press, 2018.
5. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, 2009.
6. B.S. Gottfried, "Programming with C++", 3rd edition, Tata McGraw Hill, 2018.
7. Abhiram G. Ranade, "An Introduction to Programming through C++", McGraw Hill Education.
8. Yashavant Kanetkar, "Let Us C++", BPB Publication.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain basic programming terms, syntax, algorithm and flow chart.
CO2. apply programming concept to implement, debug and test any C++ program.
CO3. solve computational problems using decision control and loops.
CO4. design a program using the concept of array, pointer and functions.
CO5. choose appropriate file handling operations to work efficiently with files.

Department of Computer Science and Business Systems

DIGITAL LOGIC DESIGN
30241103

COURSE OBJECTIVES

- To familiarize with number representation and conversion between various representations in digital electronic circuits.
- To expose the logical operations using combinational logic circuits, sequential logic circuits and the characteristics of memory and their classification.

Unit I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary, Decimal, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-Triggered D Flip-flop, Edge-Triggered JK Flip-flop, JK Master-Slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit V

Introduction to Memory, Classification of Memories, Memory Decoding, Programmable Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL).

RECOMMENDED BOOKS

1. Fundamentals of Digital Logic Design by Charles H. Roth, Jr. Cengage, 7th Edition.
2. Digital Design, Morris Mano M. and Michael D. Ciletti, Pearson Education, 6th Edition.
3. Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain different number systems and conversion among them and codes.
CO2. simplify the logic expressions using Boolean laws, and map methods and design them by using logic gates.
CO3. develop the understanding of combinational circuits and design them.
CO4. analyze different types of flip-flops and design a sequential logic circuit.
CO5. compare various memories used in computers.

Department of Computer Science and Business Systems

BUSINESS COMMUNICATION
30241104

COURSE OBJECTIVES

- The course intends to build the required communication skills of the students to communicate effectively in real-life situations like starting a talk and be comfortable using English language.
- The students are expected to enrich their knowledge of language, culture, and ethics through this course.

Unit I

Communication: Approaches, Elements, Barriers to Communication; Johari Communication Window, Proxemics, Chronemics, Language of Spaces, Time, Silence, Touch, and Para Language, Classification of Communication as Interpersonal, Intrapersonal, Extra-personal, Mass, Conflict and Negotiation, Communication and Perception.

Unit II

Interpersonal Communication: Interpersonal Communication and Interpersonal relations; Interpersonal barriers to Communication, Motivation in Interpersonal Communication, Interpersonal Skills, Importance of Interpersonal skills, Role of Self-Disclosure in Interpersonal Communication.

Unit III

Corporate Communication: Organizational and/or Management Communication, Corporate Communication Tools (Lobbying, Networking, Media, Identity, Reputation) Dealing with Financial Matters, Ethics, Laws, Role of Technology and Social Media in Corporate Communication. **Report writing:** Formal reports, Writing effective letters, Different types of business Letters, Interview techniques, Communication etiquettes.

Unit IV

Listening: Factors Affecting Listening, Kinds of Listening, Improving Listening, **Public Speaking:** Group Discussions, Small Group Talks, Debates, Meetings, Delivering Presentation, 7Cs of Delivering a Presentation, Personal Interviews. **Barriers of Communication:** Types of barriers, Technological, Socio-Psychological Barriers, Overcoming barriers.

Unit V

Soft Skills: Introduction to Soft Skills, How to Groom Personality, Difference Between Personalist And Character, Role of Attitudes, Emotions and Feelings, Developing Interpersonal Relations, Emotional Intelligence, Creativity and Mind Mapping.

RECOMMENDED BOOKS

1. "Understanding Human Communication", Ronald & Alderman, OUP.
2. "Communication Skills for Engineers", Pearson Education.
3. "Corporate Communication", Joep P Cornelissen, Sage Publications.
4. "Effective Presentation Skills", Asha Kaul, Sage Response.
5. "Corporate Reputation Decoded", Asha Kaul, Sage Response.
6. "Personality Development & Soft Skills", Barun K Mitra, Oxford University Press.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. learn the importance of communication to serve a variety of audiences and purposes.
CO2. prepare oral dialogues and arguments within the profession effectively.
CO3. demonstrate ability to deliver on a topic in a professional setting.
CO4. delineate issues assessing the results in arguments using appropriate material for support.
CO5. validate professional behaviour and conduct while in a communication situation.

Department of Computer Science and Business Systems

MATRICES AND CALCULUS
30241105

COURSE OBJECTIVES

- To understand types of matrices and their properties.
- To know the concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- To understand Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- To expose the concept of ordinary and partial differentiation, evaluation of improper integrals using Beta and Gamma functions, finding maxima and minima of function of two and three variables, evaluation of multiple integrals and their applications.

Unit I

Matrices-I: Types of Matrix, Hermitian and Skew Hermitian Matrix, Unitary Matrix, Matrix Rank of a Matrix by Echelon Form and Normal Form, Inverse of Non-Singular Matrix by Elementary Transformation, Solution of System of Homogeneous and Non-Homogeneous Equations by Elementary Transformation, Consistency of Equation.

Unit II

Matrices-II: Linear Dependence of Vectors, Eigen Values and Eigenvectors with their Properties, Cayley Hamilton Theorem and its application to finding Inverse of Matrix, Diagonalization of a Matrix.

Unit III

Differential Calculus–I: n^{th} Derivative, Leibnitz's Theorem, Partial Derivatives, Euler's Theorem for Homogeneous Functions, Total Derivatives, Change of Variables.

Unit IV

Differential calculus-II: Taylor's and Maclaurin's Theorems, Expansion of Function of Several Variables, Jacobian, Properties of Jacobian, Approximation of Errors, Extrema of Functions of Several Variables (Maxima and Minima of Function of One and Two Variables), Lagrange's Method of Multipliers (Simple Applications).

Unit V

Integral Calculus: Beta and Gamma Function and its Properties, Transformation of Beta Function and Gama Function, Relation Between Beta and Gama Function, Double

and Triple Integrals, Change of Order of Integration, Application of Integration to Volumes and Surface Areas.

RECOMMENDED BOOKS

1. E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
2. C.L Liu: Discrete Mathematics, 4th Edition 2012.
3. R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt. Ltd, 5th Edition (2016).
4. F. B. Hildebrand: Advanced Calculus for application, Englewood Cliffs, N. J. Prentice- Hall, 2nd Edition (1980).
5. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015).
6. B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. solve the problem of matrix.
CO2. make use of various matrix in engineering problems.
CO3. apply differential Calculus in basic engineering problems.
CO4. determine the solution of various complex problems using integration techniques.
CO5. estimate the engineering problems using series methods.

Department of Computer Science and Business Systems

LANGUAGE LAB
30241110

COURSE OBJECTIVES

- The course intends to build the required communication skills of the students to communicate effectively in real-life situations like starting a talk and be comfortable using English language.
- It aims at teaching students to appreciate English language through the study of scientific, creative, and academic text.
- The course is designed to acquaint students with structure of English language used in literature, functional varieties, figurative language, and verbal concomitance.
- The students are expected to enrich their knowledge of language, culture, and ethics through this course.

Unit I

Communication: Approaches, Elements, Verbal and Nonverbal Communication; Barriers to Communication; Johari Communication Window.

Unit II

Listening: Factors Affecting Listening and Improving Listening.

Unit III

Speaking: Public Speaking & Delivering Presentation.

Unit IV

Reading: Reading Passages & Comprehension: Steps and Methods.

Unit V

Writing: Essentials of good writing; Drafting CV/biodata/Résumé)

Language Laboratory:

The objective of the language lab is to expose students to a variety of listening and speaking drills. This would especially benefit students who are deficient in English and it also aims at confidence building for interviews and competitive examinations. The Lab is to cover following syllabus.

1. Communication lab exercises as specified in Lab Manual
2. Listening skills (using Marc Hancock, CUP).
3. Speaking skills

4. Oral presentation.

RECOMMENDED BOOKS

1. "Understanding Human Communication", By Ronald Alderman by OUP
2. "Communication Skills for Engineers", Pearson Education.
3. "Practical English Grammar by Thomson Martinet", Oxford University Press
4. "A Handbook of Language laboratory by P Sreekumar", Cambridge University Press.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. speak clearly effectively and appropriately in a public forum to a variety of audiences and purposes.
CO2. prepare oral dialogues and arguments within the Engineering Profession effectively.
CO3. demonstrate knowledge and comprehension of major text and traditions in language as well as its social, cultural, and historical context.
CO4. read a variety of Text analytically to demonstrate in writing and/or speech the interpretation of texts.
CO5. interpret text written in English assessing the results in written and oral arguments using appropriate material for support.

Department of Computer Science and Business Systems

UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS (UHVPE) 30241111

COURSE OBJECTIVES

- To sensitization of student towards self, family (relationship), society and nature.
- To understand (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
- To strengthening of self-reflection.
- To development of commitment and courage to act.

Unit I

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

- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

Unit II

Understanding Harmony in the Human Being:

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of 'I' with the Body

Unit III

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

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society

Unit IV

Understanding Harmony in the Nature and Existence - existence as Coexistence:

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all pervasive space
- Holistic perception of harmony at all levels of existence.

Unit V

Holistic Understanding of Harmony on Professional Ethics:

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics:
  a. Ability to utilize the professional competence for augmenting universal human order
  b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,
  c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Strategy for transition from the present state to Universal Human Order:
  a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
  b. At the level of society: as mutually enriching institutions and organizations

Gender Sensitization:

- Introduction to Sex, Gender & Culture
- Introduction to Women Studies and Socialisation, including man-woman relationship, work distribution
- A brief review of Feminism, Patriarchy, Feminist Studies, Feminist Ideologies.
- Women and Law Constitutional Provisions and Fundamental rights related to Women.

RECOMMENDED BOOKS

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. On Education - J Krishnamurthy
6. Siddhartha - Hermann Hesse
7. Old Path White Clouds - Thich Nhat Hanh
8. On Education - The Mother
9. Diaries of Anne Frank - Anne Frank
10. Life and Philosophy of Swami Vivekananda
11. Swami Vivekananda on Himself
12. Small is Beautiful - E. F Schumacher.
13. Slow is Beautiful - Cecile Andrews

14. Economy of Permanence - J C Kumarappa
15. Bharat Mein Angreji Raj - Pandit Sunderlal
16. Mahatma and the Rose
17. The Poet and the Charkha
18. Rediscovering India - by Dharampal
19. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
20. Swaraj by Arvind Kejriwal
21. India Wins Freedom - Maulana Abdul Kalam Azad
22. Ramakrishna ki jeevani - Romain Rolland (English)
23. Vivekananda - Romain Rolland (English)
24. Gandhi - Romain Rolland (English)
25. Autobiography of a Yogi – by Paramhansa Yogananda
26. Gandhi and Question of Science – Sahatsrabudhe

COURSE OUTCOMES

After completion of the course students would be able to:

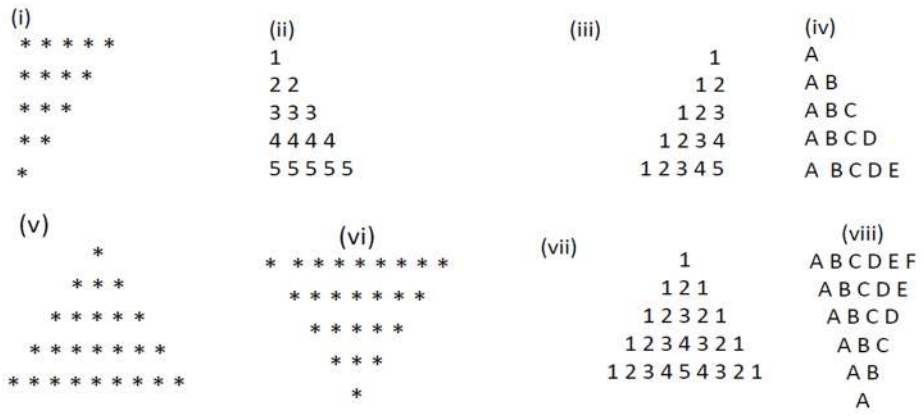
CO1. identify problems related to society, social and their sustainable solutions.
CO2. become sensitive to their commitment towards what they believe in (humane values. humane relationships and humane society).
CO3. apply what they have learnt to their own self in different day-to-day settings in real life.
CO4. sustain human relationships and human nature in mind.
CO5. change living in harmony with self and others.

Department of Computer Science and Business Systems

COMPUTER PROGRAMMING
30241106

LIST OF PROGRAMS

1. Write a program to add two numbers and display its sum.
2. Write a Program to calculate and display the volume of a cylinder for height and radius parameters to be input from the user.
3. Write a program to realize the following expressions:
   a. V = u + at
   b. S = ut+1/2a
   c. T=2*a+√b+9c
4. Write a program to take input of name, rollno and marks obtained by a student in 5 subjects of 100 marks each and display the name, rollno with percentage score secured.
5. Write a program to swap values of two variables with and without using the third variable.
6. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
7. Write a program to find the largest of three numbers using ternary operators.
8. Write a program to find the roots of quadratic equation.
9. Write a Program to Check Whether a Number is Prime or not.
10. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)
11. Write a program to print the sum of digits of a number using for loop.
12. Write a program to display the following pattern using for loops.



13. Write a program to calculate factorial of a number using recursion.
14. Write a program to add two matrices of the same order.
15. Write a program to add two complex numbers, use structure data-type to represent complex numbers.

COURSE OUTCOMES

After completing this, the students will be able to:

CO1. write computer program in C++ language.
CO2. develop algorithms and flowchart for a given problem.
CO3. apply programming syntax to implement program.
CO4. apply knowledge of programming to solve real-world problems
CO5. design suitable programming solutions using procedural paradigms.

Department of Computer Science and Business Systems

BUSINESS COMMUNICATION
30241107

LIST OF ACTIVITIES

1. **Business terminology:** Learning the terminology required for communications in business.
2. **Public Speaking Exercises:** Students can give speeches, presentations, or impromptu talks on various business topics.
3. **Business Letter Writing:** Students can write formal letters, emails, or memos for different business scenarios (e.g., job applications, complaints, proposals).
4. **Group Discussions:** Students can participate in group discussions on various business topics, practicing their listening, speaking, and critical thinking skills.
5. **Team Presentations:** Students can work in teams to prepare and deliver presentations on assigned topics.
6. **SWOT analysis:** Identifying the strengths,weaknesses,opportunities and threats of themselves.
7. **Conflict management:** Students can practice handling workplace conflicts.
8. **Role Play: Client Meetings:** Students can practice verbal communication and active listening.
9. **Mock Interviews:** This will improve their interview and interpersonal communication skills.

   Task: One student acts as a job candidate while another acts as the interviewer. The interviewer asks standard business interview questions, and the candidate practices responding professionally.
10. **Non-Verbal Communication Exercise:** Students will learn to recognize the role of body language and tone in communication.
11. **Crisis Communication Simulation:** Students will develop skills for handling communication during a crisis.
12. **Telephone Communication Practice:** This will improve their verbal communication over the phone.
13. **Right use of social media:** Understanding the role of social media in today's era.
14. **Organization Repute:** Maintaining the image and pride of the organization.

COURSE OUTCOMES

After completing this, the students will be able to:

CO1. use business vocabulary and take part comfortably in business conversations in English.
CO2. draft letters and reports with appropriate formats and choice of words.
CO3. perform well in team and group, resolve conflicts in workplaces and acquire leadership skills.

CO4. deliver a public speech according to the need of the audience and also be aware of positive body language to be manifested during a speech.

CO5. deal with the deeper parameters of working in teams like team motivation, multicultural team activity and team conflict resolution

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Department of Computer Science and Business Systems

LIST OF MICRO PROJECT-1
30241109

1. Write a program to convert temperatures between Celsius, Fahrenheit, and Kelvin.
2. Create a calculator that performs addition, subtraction, multiplication, and division.
3. Implement a program to check if a given string is a palindrome.
4. Generate the Fibonacci sequence up to a specified number of terms.
5. Simulate a simple ATM system with basic functionalities like check balance, deposit, and withdraw.
6. Create a basic banking application with functionality to add, view, and delete account details.
7. Develop a game where the user guesses a randomly generated number within a certain range.
8. Count the frequency of each character in a given string and display the results.
9. Develop a system to manage books in a library, including adding, removing, and searching for books.
10. Two strings A and B are given, each consisting of lower case alphabets. Write a program to find whether it is possible to choose some non-empty strings s1 and s2 where s1 is a substring of A, s2 is a substring of B such that s1 + s2 is a palindromic string. Here '+' denotes the concatenation between the strings, and if there are such strings S1 and S2 then print S1+S2.
11. Following conditions are given based on three subjects marks:
    a. Physics marks must be greater than 80
    b. Chemistry marks must be greater than 80
    c. English marks must be greater than 70
    d. Students are awarded grade 10 if all three conditions are met. Grade 9 is given if conditions a and b are met. Grade 8 is given if conditions b and c are met. Grade 7 is given if a and c are met. Grade is 6 if only one condition is met . Grade is 5 if none of the three conditions are met. Write a program to display the grade of students, based on the values of physics, chemistry and English, given by the user. Also, display the calculated grade only if the overall marks (out of 300) are greater than 32%, otherwise display 'the student is Fail'.
12. Design a flowchart to implement the Tic-Tac-Toe game and hence implement the same using C++.
13. Write a program in C++ that implements the operations performed by an ATM. The operations include: Balance check, Withdraw Cash, Deposit cash etc.
14. Create a login module using C++ with below mentioned features:
    a. Verify username and password correctly.
    b. Register new user and set its password.
    c. Change password of any registered user.
15. The mouse pointer can be restricted in particular rectangle. The idea is to create a function called restrictmouse() which takes four parameters which containing X coordinate and Y coordinate. First point mention the top of the rectangle and the second point mention the bottom of the rectangle. Below are the functions used for the same:
    initmouse(): use to initialize mouse.
    showmouse(): shows the mouse pointer on the output screen.

restrictmouse(): used to set Horizontal and vertical limit of the mouse pointer by setting the following parameters. AX = 7 for horizontal and AX = 8 for vertical.

16. This following program makes use of some sub function, which were already discussed previously, and shows how they can be used to write useful programs like free-hand drawing. Below are the functions used:

initmouse(): use to initialize mouse.
showmouse(): shows mouse pointer on the output screen.
hidemouse(): used to hide mouse while drawing.
getmouseposition(): Fetches current location of the pointer and draw line accordingly.

17. (The Sieve of Eratosthenes) A prime integer is any integer greater than 1 that can be divided evenly only by itself and 1. The Sieve of Eratosthenes is a method of finding prime numbers. It works as follows:

a) Create an array with all elements initialized to 1 (true). Array elements with prime subscripts will remain 1. All other array elements will eventually be set to zero.
b) Starting with array subscript 2 (subscript 1 is not prime), every time an array element is found whose value is 1, loop through the remainder of the array and set to zero every element whose subscript is a multiple of the subscript for the element with value 1. For array subscript 2, all elements beyond 2 in the array that are multiples of 2 will be set to zero (subscripts 4, 6, 8, 10, and so on.). For array subscript 3, all elements beyond 3 in the array that are multiples of 3 will be set to zero (subscripts 6, 9, 12, 15, and so on.).

When this process is complete, the array elements that are still set to 1 indicate that the subscript is a prime number. Write a program that uses an array of 1000 elements to determine and print the prime numbers between 1 and 999. Ignore element 0 of the array.

18. (Airline Reservations System) A small airline has just purchased a computer for its new automated reservations system. The president has asked you to program the new system. You'll write a program to assign seats on each flight of the airline's only plane (capacity: 10 seats). Your program should display the following menu of alternatives:

Please type 1 for "first class"
Please type 2 for "economy"

If the person types 1, then your program should assign a seat in the first class section (seats 1–5). If the person types 2, then your program should assign a seat in the economy section (seats 6–10). Your program should then print a boarding pass indicating the person's seat number and whether it's in the first class or economy section of the plane.

Use a single-subscripted array to represent the seating chart of the plane. Initialize all the elements of the array to 0 to indicate that all seats are empty. As each seat is assigned, set the corresponding element of the array to 1 to indicate that the seat is no longer available.

Your program should, of course, never assign a seat that has already been assigned. When the first class section is full, your program should ask the person if it's acceptable to be placed in the economy section (and vice versa). If yes, then make the appropriate seat assignment. If no, then print the message "Next flight leaves in 3 hours."

19. (Total Sales) Use a double-subscripted array to solve the following problem. A company as four salespeople (1 to 4) who sell five different products (1 to 5). Once a day, each salesperson passes in a slip for each different type of product sold. Each slip contains:

a) The salesperson number
b) The product number
c) The total dollar value of that product sold that day

Thus, each salesperson passes in between 0 and 5 sales slips per day. Assume that the information from all of the slips for last month is available. Write a program that will read all this information for last month's sales and summarize the total sales by salesperson by product. All totals should be stored in the double-subscripted array sales. After processing all the information for last month, print the results in tabular format with each of the columns representing a particular salesperson and each of the rows representing a particular product. Cross total each row to get the total sales of each product for last month; cross total each column to get the total sales by salesperson for last month. Your tabular printout should include these cross totals to the right of the totaled rows and to the bottom of the totaled columns.

20. Missing number in array: Given an array of size N-1 such that it only contains distinct integers in the range of 1 to N. Displaymissing element. Complete the function MissingNumber() that takes array and N as input parameters and returns the value of the missing number.

a) Input:
b) N = 5
c) A[] = {1,2,3,5}
d) Output: 4

21. Corporate Newsletter Creation

a) **Objective:** Create a sample corporate newsletter for a real or hypothetical company.
b) **Tasks:** Write articles, design the layout, and ensure alignment with company branding and messaging.
c) **Skills Developed:** Writing, editing, graphic design, and understanding of corporate culture.

22. Presentation Skills Workshop

a) **Objective:** Develop a workshop to improve presentation skills in a business setting.
b) **Tasks:** Identify key presentation skills, create training materials (slides, practice exercises), and deliver a mock workshop.
c) **Skills Developed**: Public speaking, coaching, material development, and feedback analysis.

23. Employee On boarding Manual

a) **Objective:** Create an on boarding manual for new employees of a specific company or department.

b) **Tasks**: Research the company's policies, procedures, and culture; write and design a user-friendly manual.
c) **Skills Developed:** Writing, document design, research, and understanding of organizational culture.

24. Virtual Team Communication Plan

a) **Objective:** Develop a communication plan for managing a virtual team effectively.
b) **Tasks**: Identify tools and platforms, establish communication norms, create a schedule, and draft templates for regular updates.
c) **Skills Developed:** Virtual collaboration, strategic planning, time management, and digital communication.

25. Crisis Communication Case Study

a) Research a past crisis and analyze the company's communication response.

26. Interview Analysis: Conduct an interview with a business professional and analyze their communication style.

27. Negotiation Simulation: Role-play a negotiation scenario with a partner, focusing on effective communication, persuasion, and compromise.

28. Public Speaking Practice: Public Speaking Practice: Develop and deliver a public speech on a business-related topic, focusing on clarity, confidence, and audience engagement.

29. Customer Feedback Analysis

a) **Objective:** Analyze customer feedback for a product or service to identify trends and areas for improvement.
b) **Tasks:** Collect customer feedback from online reviews, social media, or surveys. Categorize feedback and suggest actionable recommendations.
c) **Skills Developed:** Data analysis, critical thinking, report writing, and customer relationship management.

30. Designing a Training Workshop

a) **Objective:** Create and present a training workshop on effective communication skills for a specific audience (e.g., customer service staff, sales team).
b) **Tasks:** Research communication challenges, develop training materials (slides, handouts), and present the workshop.
c) **Skills Developed**: Public speaking, instructional design, research, and facilitation.

COURSE OUTCOMES

After completing this, the students will be able to:

CO1. apply knowledge of programming to solve real-world problems.
CO2. analyze the problems and choose suitable programming techniques to develop solutions.

CO3. design, implement, debug and test programs.
CO4. design, implement, and refine a C++ application, collaboratively within a team.
CO5. deal with the deeper parameters of working in teams like team motivation, multicultural team activity and team conflict resolution

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