ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

Syllabus for BCA

Semester 1

Theory										
S. No.	Course Code	Topic	L	T	P	Credit	Theory Marks	Internal Marks	Practical Marks	Total Marks
1	BCA101	Fundamentals of IT	3	1	0	4	80	20	0	100
2	BCA102	C Programming	3	1	0	4	80	20	0	100
3	BCA103	Discrete Mathematical Structure	4	0	0	4	80	20	0	100
4	BM101	Principle of Management	4	0	0	4	80	20	0	100
5	BM102	Business Communication	3	1	0	4	80	20	0	100
		Total of Theory				20	400	100	0	500
Practical										
6	BCA191	C Programming Lab	0	0	6	6	0	20	80	100
7	BM191	Business Communication Lab	0	0	6	6	0	20	80	100
		Total of Practical				12	0	40	160	200
		Total				**32**	**400**	**140**	**160**	**700**

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Detailed Syllabus

FUNDAMENTALS OF IT

Code: BCA101

Max Marks: 80

UNIT I (6 Hrs)

Introduction to Computers: Characteristics of computers, Evolution of computers, Generation of computers, Block diagram of computer & role of each block, classification of computers, applications of computers.
Input and Output Devices: Keyboard, pointing devices, speech recognition, digital camera, scanners, optical scanners. Classification of output devices, printers, plotters. computer output microfilm (COM), Classification of output devices, devices- monitors, audio output, projectors and terminals.
Primary and Secondary Memory: Memory hierarchy, Random access memory (RAM), types of RAM, Read only memory (ROM), types of ROM. Classification of secondary storage devices, magnetic tape, magnetic disk, optical disk.

UNIT II (6 Hrs)

Number Systems: Introduction to number system, Binary, Octal, Hexadecimal, conversion between number bases, Arithmetic operations on binary numbers.
Alphanumeric- BCD, EBCDIC, ASCII, Unicode.
Computer Software: Software definition, relationship between software and hardware. software categories, system software, application software, utility software.
Computer Languages: Introduction, classification of programming languages, generations of programming languages, features of a good programming language.

UNIT III (10 Hrs)

MS Word: Word processing, MS-Word features, creating saving and opening documents in Word, interface, toolbars, ruler, menus, keyboard shortcut, editing, previewing. printing & formatting a document, advance features of MS Word, find & replace. Using thesaurus, mail merge, handling graphics, tables, converting a Word document into various formats like-text, rich text format, Word perfect, etc.

UNIT IV (10 Hrs)

MS Excel: Worksheet basics, creating worksheet, entering data into worksheet, data, text. dates, alphanumeric values saving & quitting worksheet, opening and moving around in an existing worksheet, Toolbars and menus, Keyboard shortcuts, working with single and multiple workbook, working with formula & cell referencing, Auto sum, coping formulas. absolute and relative addressing, formatting of worksheet, previewing & printing worksheet, Graphs and Charts, Database, macros, multiple worksheets-concepts.

UNIT V (12 Hrs)

Power Point: Creating and viewing a presentation, managing Slide Shows, navigating through a presentation, using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with Master Slides, applying and modifying designs, adding graphics, multimedia and special effects.
Microsoft Access: Planning a database (tables, queries, forms, reports), creating and editing database, customizing tables, linking tables, designing and using forms. modifying database structure, Sorting and Indexing database, querying a database and generating reports.

Text Book:

1. Introduction to Computer, Peter Norton's, Tata McGraw Hill Publication

Reference Books:

1. Microsoft; 2007/2010 Microsoft Office System; PHI.
2. Microsoft; Microsoft Office 2007/2010: Plain & Simple; PHI.
3. Sanjay Saxena; A First Course in Computers 2003 Edition; Vikas Pub.
4. Computer Fundamentals by P.K. Sinha, BPB Publication.
5. Computer Fundamentals and Programming in C, Reema Thareja, OXFORD University Press.
6. MS-Office, Dr. S.S. Shrivastava, Published by Laxmi Publication.
7. Office 2019: In Easy Steps, Michal Price, BPB Publication.

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C PROGRAMMING

Code: BCA102

Max Marks: 80

UNIT I (8 Hrs)

Computer Programming: Basic Programming concepts, Modular programming and structured programming, Problem solving using Computers, Concept of flowcharts and algorithms.

Overview of C: Introduction, Importance of C, Sample C Programs, Basic structure of C programs, Programming style, Executing a C Program.

Constants, Variables and Data types: C Tokens, keywords, and identifiers, constants, variables, datatypes, declaration of variables, assigning values to variables, defining symbolic constants.

Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, increment and decrement operators, conditional operator, bitwise operators, type conversion in expressions, operator precedence and associativity.

Mathematical functions.

UNIT II (12 Hrs)

Input and Output statements, reading a character, writing a character, formatted input, formatted output statements.

Decision-making, Branching and Looping : Decision making with IF statement, simple IF statement, The IF-ELSE statement, nesting of IF .. ELSE statements, The ELSE -IF ladder, The switch statement, The ?: operator, The GOTO statement, The WHILE statement, The DO statement, The FOR statement, jumps in loops.

UNIT III (10 Hrs)

Arrays: One dimensional arrays, Two-dimensional arrays, initializing arrays, Programs based on arrays such as sorting, Fibonacci sequence, matrix operations, etc.

Handling of Characters and Strings: Declaring and initializing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together. Comparison of two strings, character and string handling functions.

UNIT IV (8 Hrs)

User defined functions: Need for user-defined functions, a multi-functional program, the form of 'C' function, Return values and their types, calling a function, category of functions: No arguments and no return values, arguments but no return values, arguments with return values, nesting of functions, recursion, functions with arrays as parameters.

UNIT V (5 Hrs)

Structure and Union: Structure definition, giving values to members, structure initialization; comparison of structure variables, array of structures, array within structure, union.

Pointers: Understanding pointers, accessing the address of variables, declaring and initializing pointers, accessing a variable through its pointer.

Text Book:

1. Kamthane, Programming with ANSI and Turbo C; Pearson Education 2003

Reference Books:

1. E.Balaguruswamy. : Programming in ANSI C", Tata McGraw-Hill (1998)
2. Yeshvant Kanetkar: "Let us C"
3. V. Rajaraman.: "Programming in C", PHI (EEE) (2000)
4. Rajesh Hongal : "Computer Concepts & C language"
5. Brain Kernighan & Dennis M. Ritchie "ANSI C Programming" (PHI)

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DISCRETE MATHEMATICAL STRUCTURE

Code: BCA103

Max Marks: 80

UNIT I (10 Hrs)

Set Theory : Relations and Functions : Set Notation and Description, subset, basic set operations, Venn Diagrams, laws of set theory, partitions of sets, min sets, duality principle, basic definitions of relations and functions, graphics of relations, properties of relations: injective, surjective and bijective functions, compositions.

UNIT II (8 Hrs)

Recurrence : Recurrence Relations and Recursive Algorithms – Linear-Recurrence Relations with Constant Coefficients; Homogeneous Solutions : Particular Solution, Total Solution, Solution by the Method of Generating functions.

UNIT III (8 Hrs)

Graph Theory : Graph and planar graphs – Basic Terminology, Multi-graphs, Weighted Graphs, Paths and Circuits, Shortest Paths, Eulerian Paths and Circuits.

Travelling Salesman Problem, Planar Graphs.

UNIT IV (10 Hrs)

Automata Theory : Finite State Machines–Equivalent Machines, Finite State Machines as language Recognizers; Analysis of Algorithms - Time Complexity, Complexity of Problems.

UNIT V (8 Hrs)

Prepositional Logic: Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory

Text Book:

1. Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill Education, 8th edition 2021

Reference Books:

1. Doerr, A. and Kenneth, L., Applied Discrete Structures for Computer Science, 1989, Galgotia Publications Pvt. Ltd.
2. Liu, C. L., 1985, Elements of Discrete Mathematics, McGraw Hill.
3. Seymour Lipschutz and Lipson, :2000 Solved Problems in Discrete Mathematics, McGraw- Hill., 1992

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PRINCIPLE OF MANAGEMENT

Code: BM101

Max Marks: 80

UNIT I (8 Hrs)

Nature of Management: Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration Organization, Management Skills, Levels of Management.

UNIT II (8 Hrs)

Evolution of Management Thought: Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Barhard & Peter Drucker to the management thought. Business Ethics & Social Responsibility: Concept, Shift to Ethics, Tools of Ethics.

UNIT III (10 Hrs)

Functions of Management: Part-I

Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, levels, advantages & limitations, Forecasting- Need & Techniques

Decision making-Types - Process of rational decision-making & techniques of decision-making

Organizing – Elements of organizing & processes: Types of organizations, Delegation of authority – Need, difficulties, Delegation – Decentralization

Staffing – Meaning & Importance, Direction – Nature – Principles, Communication – Types & Importance

UNIT IV (8 Hrs)

Functions of Management: Part-II

Motivation – Importance – theories

Leadership – Meaning –styles, qualities & function of leader Controlling - Need, Nature, importance, Process & Techniques, Total Quality Management Coordination – Need –Importance

UNIT V (8 Hrs)

Management of Change: Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management.

Strategic Management: Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India

Text Book:

1. Principles & Practice of Management - Dr. L.M. Prasad, Sultan Chand & Sons - New Delhi

Reference Books:

1. Essential of Management - Horold Koontz and Iteinz Weibrich - McGraw hills International
2. Management Theory & Practice - J.N. Chandan
3. Essential of Business Administration - K. Aswathapa Himalaya Publishing House
4. Business Organization & Management - Dr. Y.K. Bhushan
5. Management: Concept and Strategies By J. S. Chandan, Vikas Publishing
6. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
7. Business organization and Management by Talloo by Tata McGraw Hill

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BUSINESS COMMUNICATION

Code: BM102

Max Marks: 80

UNIT I (8 Hrs)

Means of Communication:
Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of good communication – Communication barriers, 7C's of Communication

UNIT II (12 Hrs)
Types of Communication:
Oral Communication: Meaning, nature and scope – Principle of effective oral communication – Techniques of effective speech – Media of oral communication (Face -to-face conversation – Teleconferences – Press-Conference – Demonstration – Radio Recording – Dictaphone – Meetings – Rumour –Demonstration and Dramatisation – Public address system – Grapevine – Group Discussion –Oral report – Closed circuit TV). The art of listening – Principles of good listening.

UNIT III (5 Hrs)
Written Communication
Purpose of writing, Clarity in Writing, Principles of Effective writing, Writing Techniques, Electronic Writing Process.

UNIT IV (12 Hrs)
Business Letters & Reports:
Need and functions of business letters – Planning & layout of business letter – Kinds of business letters – Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports.

Drafting of business letters: Enquiries and replies – Placing and fulfilling orders – Complaints and follow-up Sales letters –Circular letters Application for employment and resume

UNIT V (6 Hrs)
Information Technology for Communication:
Word Processor – Telex – Facsimile(Fax) – E-mail – Voice mail –Internet – Multimedia –Teleconferencing – Mobile Phone Conversation – Video Conferencing –SMS – Telephone Answering Machine – Advantages and limitations of these types.

Text Book:

1. Business Communication - M. Balasubrahmanyan - Vani Educational Books

Reference Books:

1. Business Communication - K. K. Sinha - Galgotia Publishing Company, New Delhi.
2. Media and Communication Management - C. S. Rayudu - Himalaya Publishing House, Bombay.
3. Essentials of Business Communication - Rajendra Pal and J. S. Korlhalli - Sultan Chand & Sons, New Delhi.
4. Business Communication (Principles, Methods and Techniques) Nirmal Singh - Deep & Deep Publications Pvt. Ltd., New Delhi.
5. Business Communication - Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal and Prof. Ravindra Kothavade - Diamond Publications, Pune.
6. Business Correspondence and Report Writing - R. C. Sharma, Krishna Mohan - Tata McGraw Hill Publishing Company Limited, New Delhi.
7. Communicate to Win - Richard Denny - Kogan Page India Private Limited, New Delhi.
8. Modern Business Correspondence - L. Gartside - The English Language Book Society and Macdonald and Evans Ltd.

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COMPUTER LAB-1

(BASED ON BCA102) C Programming:

Part A

1. To find the roots of the quadratic equation (ax2+bx+c=0) with different possible input values for a, b and c.
2. Write a program to take input of name, roll no and marks obtained by a student in 4 subjects of 100 marks each and display the name, roll no with percentage score secured.
3. To check whether the given integer is PALINDROME or NOT
4. To find Square Root of a given Number.
5. To check whether the given year is leap year or not.
6. To find the value of the polynomial Design and develop an algorithm for evaluating the polynomial f(x)=a4 x4+a3 x3+a2 x2+a1 x+a0,foragivenvalueofxandits coefficients using Horner's method.
7. To arrange given N integers in ascending order using Bubble Sort.

Part B

1. To read two matrices A(m x n)and B(p x q) and Compute the product A and B.
2. To search a name in list of names using Binary Searching Technique
    A) To execute a C program that Implements string copy operation STRCOPY(str1,str2) that copies a string str1 to another string str2 without using library function.
    B) To Read a sentence and prints frequency of each of the vowels and total count of consonants.
3. Design and develop a function is prime (x) that accepts an integer argument and returns 1if the argument is prime and 0 otherwise. The function must use plain division checking approach to determine if a given number is prime. Invoke this function from the main with different values obtained from the user and print appropriate messages
4. Draw the flow chart and write a Recursive C function to find the factorial of number n! defined by fact(n)=1, if n=0, otherwise fact(n)=n*fact(n-1),using this function write a c program to compute the binomial co-efficient nCr. Tabulate the results for different values of n and r using suitable messages.
5. Given two university information files "studentname.txt" and "usn.txt" that contains students names and USN respectively. Write a C program to a new file called "output.txt" and copy the content of files "studentname.txt" and "usn.txt" into output file in the sequence shows below. Display the content of output file "output.txt" on to the screen.
6. Write a C program to maintain a record of "n" student details sing an array of structures with four fields (Roll number, Name, marks, and Grade). Each field is of an appropriate data type. Print the marks of the student given name as input.

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BUSINESS COMMUNICATION LAB-1

(BASED ON BM102) Business Communication:

1. **Communication**: Objectives & Process of Communication, Essential Components of the process of Communication, Importance and Objectives of Communication, Differences between general and technical communication. Types of Communication (Extrapersonal, Intrapersonal, Interpersonal, Organizational & Mass Communication)
2. **Verbal & Non-Verbal Communication:** listening, Speaking, Reading and Writing, Verbal and Non-Verbal Communication, Intra, inter-personal and group communication skills. Gestures, postures, Proxemics, Kinesics, Listening to Lectures, Discussion, Talk Shows, News Programs.
3. **Writing Skills:** Formal & Informal writings, report writing, creative writing. Composition, Resume writing, cover letters, Business Letter Writing, Persuasive Letters, Job Applications and Official Correspondence, E-mail etiquette, Precise writing
4. **Presentation Skills:** Elements of effective presentation, structure of presentation, external factors and content, Seminar, Speeches, Lectures, Interviews, Mock Interviews
5. **Group Discussion**: Structure of GD, Moderator led and other GDs, Strategies in GD, Team work body language, Mock GD, Problem solving, Reflective thinking, Critical Thinking, Negotiation skills
6. **Career Skills:** Goal Settings, Work ethics, Problem Solving skills, Active listening, Dressing etiquette and office etiquettes. SWOT Analysis, IQ, EQ and SQ, Art of giving feedback, Decision making, Time management, Team Management and Leadership Skills, Habits of Successful people.

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Theory Paper

Total: 100 Marks

External: 80 Marks

Internal: 20 Marks

External : 80 Marks

15 Question (MCQ): 1 marks each (1x15 = 15)
10 Question (Very Short 20-30 Words): 2 marks each (2x10 = 20)
5 Question (Short 50-70 Words): 3 marks each (3x5 = 15)
Answer any 5 out of 6 (Long 100 Words): 4 marks each (4x5 = 20)
Answer any 1 out of 2 (Very Long 150-200 Words): 10 marks each (10x1 = 10)

Internal : 20 Marks

Internal Exam: 8 Marks
Assignment : 6 Marks
Attendance : 3Marks
G.P. (General Proficiency) : 3 Marks

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Syllabus for BCA

Semester 2

Theory										
S. No.	**Course Code**	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
1	BCA201	Object Oriented Programming using C++	4	1	0	5	80	20	0	100
2	BCA202	Database Management System	4	1	0	5	80	20	0	100
3	BCA203	Computer Organization	3	1	0	4	80	20	0	100
4	BM201	Management Information System	3	1	0	4	80	20	0	100
5	ESC101	Environmental Studies	2	0	0	2	80	20	0	100
6	BCA291	C++ Lab	0	0	6	6	0	20	80	100
7	BCA292	Database Management System Lab	0	0	6	6	0	20	80	100
Total						**32**	**400**	**140**	**160**	**700**

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Detailed Syllabus

OBJECT ORIENTED PROGRAMMING USING C++

Code: BCA201

Max Marks: 80

Course Objectives: This course on Object-Oriented Programming using C++ aims to equip students with a strong understanding of essential OOP concepts and practical skills in C++ syntax. Students will learn to design and implement classes, utilize inheritance and polymorphism, and apply OOP principles to real-world projects, preparing them for proficient software development in C++.

UNIT I: (14 Hours)

Principles of Object Oriented Programming (OOP): Introduction to OOP, Difference between OOP and Procedure Oriented Programming; Concepts: Object, Class, Encapsulation, Abstraction, Polymorphism and Inheritance, Applications of OOP. Special operators: scope resolution operator, Member Dereferencing operators, Memory management operators, Manipulators and Type cast operator

Structure of a C++ Program and Classes and Objects: Class Declaration : Data Members, Member Functions, Private and Public members, Creating Objects, Accessing class data members, Accessing member functions; Class Function Definition: Member Function definition inside the class declaration and outside the class declaration.

UNIT II: (14 Hours)

Friend function, inline function, Static members, Function Overloading, Arrays within a class. Arrays of Objects; Objects as function arguments: Pass by value, Pass by reference, Pointers to Objects.

Constructors: Declaration and Definition, Types of Constructors, (Default, Parameterized, Copy Constructors). Destructors: Definition and use.

Operator Overloading & Type Conversion: Conversion from basic type to user defined type, User defined to basic type and one user defined conversion to another user defined type.

UNIT III: (12 Hours)

Inheritance: Extending Classes Concept of inheritance, Base class, Defining derived classes, Visibility modes : Public, Private, Protected ;Types of Inheritance: Single inheritance : : 20 Privately derived, Publicly derived; Making a protected member inheritable, multilevel inheritance, multiple Inheritance and ambiguity of multiple inheritance, Hierarchal Inheritance, Hybrid, Nesting of classes.

Polymorphism: Definition, Application and demonstration of Data Abstraction, Encapsulation and Polymorphism. Early Binding, Polymorphism with pointers, Virtual Functions, Late binding, pure virtual functions.

UNIT IV: (6 Hours)

Exception Handling: Definition, Exception Handling Mechanism : Throwing mechanism and Catching Mechanism, Rethrowing an Exception

File Processing: Opening and closing of file, Binary file operations, structures and file operations, classes and file operations, Random file processing.

Text Book:

1. E. Balaguruswamy, 2008 : Object Oriented Programming with C++, TMH.

Reference Books:

1. Bjarne Stroustrup, 2009 : The C++ Programming Language, Addison-Wesley Publishing Company.
2. Robert Lafore, 2003 : Object Oriented Programming in Turbo C++, Galgotia Pub.
3. Salaria, R. S. : Object Oriented Programming Using C++, Khanna Book Publishing Co. (P.) Ltd., New Delhi.

C++ LAB

Code: BCA201P

Max Marks: 80

Programming Lab

PART A:

1. Write a C++ program to reverse a given number
2. Write a C++ program to add two numbers using class
3. Write a C++ program to demonstrate the usage of scope resolution operator.
4. Write a C++ program to add two numbers using functions.
5. Write a C++ program to accept and display the details of a student using class.
6. Write a C++ program to accept and display the details of an employee using a class.
7. Write a C++ program to count the number of words and characters in a given text.
8. Write a C++ program to compare two strings using string functions
9. Write a C++ program to calculate the area of rectangle, square using function overloading.
10. Write a C++ program to add two numbers using pointers.

PART-B

11. Write a C++ program to create a class template to find the maximum of two numbers.
12. Write a C++ program to display the student details using pointers.
13. Write a C++ program to calculate total sales and average sales made by a salesman.
14. Write a C++ program to check whether the given matrix is a sparse matrix or not.
15. Write a program to add integer in array in sorted location like given array of integer. Then multiply multiple of 3 with 2 and display that array in descending order
    A={4, 7, 9, 17, 18, 17, 29, 30, 35, 40}
16. Write a C++ program to find the area of circle and rectangle using virtual function.
17. Write a C++ program to perform complex number subtraction by overloading an operator using friend function.
18. Write a C++ program to swap two numbers using call by reference.
19. Write a program to convert meter to centimeter and vice versa, using data conversions and operator overloading
20. Write a program to count digits, alphabets and spaces, stored in a text file, using streams

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DATABASE MANAGEMENT SYSTEM

Code: BCA202

Max Marks: 80

Course Objectives: The course objectives of a Database Management System (DBMS) typically aim to provide students with a fundamental understanding of database concepts, including data modeling, normalization, SQL querying, and database administration. Students are expected to gain hands-on experience in designing, implementing, and managing databases to support various applications and business requirements.

UNIT -I (6 Hours)

Introduction To Database System: What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management

UNIT -II (6 Hours)

Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

UNIT-III (12 Hours)

Database Design, ER-Diagram and Unified Modeling Language: Database design and ER Model:overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML

Relational database model: Logical view of data, keys, integrity rules.

Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

UNIT-IV (10 Hours)

Relational Algebra and Calculus: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities

UNIT-V (10 Hours)

Constraints, Views and SQL: What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

UNIT-VI (8 Hours)

Transaction Management and Concurrency Control: Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management.

Text Books

1. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill

Reference Books

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 7th Edition, McGraw Hill.
2. Rajesh Narang "Database management System" PHI.
3. Ramakrishnan and Gherke, "Database Management Systems", TMH.
4. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson,5th Ed.
5. Singh S.K., "Database System Concepts, design and application", Pearson Education
6. Bipin Desai, "An Introduction to database Systems", Galgotia Publications.

DATABASE MANAGEMENT SYSTEM LAB

Code: BCA202P

Max Marks: 80

Programming Lab

PART A:

1. EMPLOYEES (Employee_Id, First_Name, Last_Name, Email, Phone_Number, Hire_Date, Job_Id, Salary, Commission_Pct, Manager_Id, Department_Id)
    a) Create Schema and insert at least 5 records for each table. Add appropriate database constraints
    b) Find out the employee id, names, salaries of all the employees
    c) List out the employees who works under Manager_Id 100
    d) Find the names of the employees who have a salary greater than or equal to 4800
    e) List out the employees whose last name is 'AUSTIN'
    f) Find the names of the employees who works in Department_Id 60, 70 and 80
    g) Display the unique Manager_Id.
2. Create Client_master with the following fields (ClientNO, Name, Address, City, State, bal_due)
    a) Create Schema and Insert five records
    b) Find the names of clients whose bal_due> 5000.
    c) Change the bal_due of ClientNO "C123" to Rs. 5100
    d) Change the name of Client_master to Client12.
    e) Display the bal_due heading as "BALANCE"
3. Create Teacher table with the following fields (Name, DeptNo, Date of joining, DeptName, Location, Salary)
    a) Create Schema and Insert five records
    b) Give Increment of 25% salary for Mathematics Department.
    c) Perform Rollback command
    d) Give Increment of 15% salary for Commerce Department
    e) Perform commit command
4. Create Sales table with the following fields (Sales No, Salesname, Branch, Salesamount, DOB)
    a) Create Schema and Insert five records
    b) Calculate total salesamount in each branch
    c) Calculate average salesamount in each branch.
    d) Display all the salesmen, DOB who are born in the month of December as day in character format i.e. 21-Dec-09
    e) Display the name and DOB of salesman in alphabetical order of the month.
5. (EmpNo, EmpName, Job,Basic, DA, HRA, PF, GrossPay, NetPay)
   (Calculate DA as 30% of Basic and HRA as 40% of Basic)
    a) Create Schema and Insert Five Records and calculate GrossPay and NetPay.
    b) Display the employees whose Basic is lowest in each department.

c) If NetPay is less than <Rs. 10,000 add Rs. 1200 as special allowances.
d) Display the employees whose GrossPay lies between 10,000 & 20,000
e) Display all the employees who earn maximum salary .

6. Employee Database
An Enterprise wishes to maintain a database to automate its operations. Enterprise is divided into certain departments and each department consists of employees. The following two tables describes the automation schemas
Dept (deptno, dname, loc)
Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)
   a) Create Schema and insert at least 5 records for each table. Add appropriate database constraints
   b) Update the employee salary by 15%, whose experience is greater than 10 years.
   c) Delete the employees, who completed 30 years of service.
   d) Display the manager who is having maximum number of employees working under him?
   e) Create a view, which contain employee names and their manager
7. Employee Database
Dept (deptno, dname, loc)
Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)
Perform the following queries
   a) Determine the names of employee, who earn more than their managers.
   b) Determine the names of employees, who take highest salary in their departments.
   c) Determine the employees, who are located at the same place.
   d) Determine the employees, whose total salary is like the minimum Salary of any department.
   e) Determine the department which does not contain any employees.
8. Consider the schema for College Database:
STUDENT(USN, SName, Address, Phone, Gender)
SEMSEC(SSID, Sem, Sec)
CLASS(USN, SSID)
COURSE(Subcode, Title, Sem, Credits)
IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)
Write SQL queries to
   a) List all the student details studying in fourth semester ‘C’ section.
   b) Compute the total number of male and female students in each semester and in each section.
   c) Create a view of Test1 marks of student USN ‘1BI15CS101’ in all Courses.
   d) Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
   e) Categorize students based on the following criterion:
If FinalIA = 17 to 20 then CAT = ‘Outstanding’
If FinalIA = 12 to 16 then CAT = ‘Average’
If FinalIA< 12 then CAT = ‘Weak’
Give these details only for 8th semester A, B, and C section students.
9. Consider the schema for Company Database:
EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate)
DLOCATION(DNo,DLoc)
PROJECT(PNo, PName, PLocation, DNo)
WORKS_ON(SSN, PNo, Hours)
Write SQL queries to
   a) Make a list of all project numbers for projects that involve an employee whose last name is ‘Scott’, either as a worker or as a manager of the department that controls the project.
   b) Show the resulting salaries if every employee working on the ‘IoT’ project is given a 10 percent raise.

c) Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
d) Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
e) For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

10. Create two tables and insert atleast 5 data in each table: employees and departments. The employees table contains information about employees such as their employee_id, name, department_id, and salary. The departments table contains information about departments such as department_id and department_name. Write a SQL query to retrieve the names of employees along with their corresponding department names. Use an inner join to achieve this.
11. Create a table named sales that contains information about sales transactions. The table has columns for transaction_id, customer_id, product_id, and amount. Insert atleast 5 data.
    Write SQL queries to perform the following tasks:
    a) Calculate the maximum amount of a single transaction.
    b) Calculate the minimum amount of a single transaction.
    c) Calculate the average amount of all transactions.
    d) Count the total number of transactions.
12. Create two tables named students and teachers. Insert altleast 5 data in each table. The students table contains information about students including student_id, student_name, and class_id. The teachers table contains information about teachers including teacher_id, teacher_name, and class_id.
    Write a SQL query to perform a full join between the students and teachers tables to retrieve information about all students and teachers, including those who are not assigned to any class.

COMPUTER ORGANIZATION

Code: BCA203

Max Marks: 80

Course Objectives: To understand the basic organization of computers and the working of each component and CPU. To bring the programming features of 8085 Microprocessor and know the features of latest microprocessors. To understand the principles of Interfacing I/O devices and Direct Memory accesses

UNIT -I (10 Hours)

Computer Organisation: Evolution of Computers, Von Neumann Architecture, Combinatorial Blocks : Gates, Half Adder, Full Adder, Multiplexers, Decoders, Encoders; Sequential Building blocks : Flip Flops, Registers, Counters, Information representation: codes, fixed and floating point representation Arithmetic: Addition and subtraction for sign magnitude and 2's complement numbers, integer multiplication using Booth's algorithms

UNIT -II (10 Hours)

Architecture of a Simple Processor: Architecture of 8086/8088 microprocessor, instruction set, Addressing Modes. Instruction: Microinstructions: Register Transfer, Arithmetic, Logical and Shift, Types of Instructions, Instruction Cycle. Interrupt: Types, Interrupt Cycle I/O organization: Strobe based and Handshake based communication, DMA based data transfer.

UNIT-III (10 Hours)

Memory Organisation: Memory Hierarchy, RAM (Static and Dynamic), ROM Associative memory, Cache memory organisation, Virtual memory organisation. Assembly Language : Features of Assembly Language,

Machine Language vs Assembly Language, Pseudo Instruction; use of Assembly for programs: Addition, Subtraction, Multiplication using Subroutines and Basic Input/ Output.

UNIT-IV (10 Hours)

System Maintenance: Introduction to various physical components of a computer, Physical Inspection and Diagnostics on PC, Functional description of various Internal and External cards; Viruses: Types of Computer Viruses, Detection, prevention and protection from Viruses

Text Book:

1. M. Morris Mano, 1993. : Computer System Architecture, Prentice Hall International, 3rd Ed.

Reference Books:

1. P. Pal Choudhri, 1994. : Computer Organisation and Design, Prentice Hall of India.
2. Biswal, Sadasiva, 2001 : Basic Electronics, Pub-Atlantic, New Delhi.
3. B. Govindarajalu, 1994. : IBM-PC and Clones - Hardware Troubleshooting and Maintenance, Tata-McGraw-Hill.

MANAGEMENT INFORMATION SYSTEM

Code: BM201

Max Marks: 80

Course Objectives: This course aims to provide students with a deep understanding of Management Information Systems (MIS) and their strategic importance in organizational decision-making. Students will learn to analyze business processes, assess information needs, and design MIS solutions, enabling them to contribute effectively to organizational success in today's digital business environment.

UNIT -I (6 Hours)

Introduction to system and Basic System Concepts: Types of Systems, The Systems Approach, Information System: Definition & Characteristics, Types of information, Role of Information in Decision-Making, Sub-Systems of an Information system: EDP and MIS management levels, EDP/MIS/DSS.

UNIT -II (6 Hours)

An overview of Management Information System: Definition & Characteristics, Components of MIS, Frame Work for Understanding MIS: Information requirements & Levels of Management, Simon's Model of decision-Making, Structured Vs Un-structured decisions, Formal vs. Informal systems

UNIT-III (6 Hours)

Developing Information Systems: Analysis & Design of Information Systems: Implementation & Evaluation, Pitfalls in MIS Development.

UNIT-IV (10 Hours)

Functional MIS: A Study of Personnel, Financial and production MIS, Introduction to e-business systems, ecommerce – technologies, applications, Decision support systems – support systems for planning, control and decision-making

Text Book:

1. Rajaraman, "Analysis and Design of Information System", PHI Publication, ISBN – 8120312270

Reference Books

1. J. Kanter, "Management/Information Systems", PHI.
2. Gordon B. Davis, M. H. Olson, "Management Information Systems – Conceptual foundations, structure and Development", McGraw Hill.
3. James A. O'Brien, "Management Information Systems", Tata McGraw-Hill.
4. James A. Senn, "Analysis & Design of Information Systems", Second edition, McGraw Hill.
5. Robert G. Murdick & Joel E. Ross & James R. Claggett, "Information Systems for Modern Management", PHI.
6. Lucas, "Analysis, Design & Implementation of Information System", McGraw Hill.

ENVIRONMENTAL STUDIES

Code: ESC101

Max Marks: 80

Course Objectives: Gain a comprehensive understanding of the natural world and human impact on it through this course. Explore topics such as ecosystems, biodiversity, climate change, and sustainability, and develop the skills to address complex environmental challenges.

UNIT -I (4 Hours)

The Multidisciplinary nature of environmental studies: Definition, scope and importance. Need for Public awareness

UNIT -II (8 Hours)

Natural Resources: Renewable and non-renewable resources : Natural resources and associated problems.

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

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

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

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

e) Energy resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources .

* Equitable use of resources for sustainable lifestyle.

UNIT-III (8 Hours)

Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposer. Energy flow in the ecosystem. Ecological succession. Food chains and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following eco-system: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (Ponds, streams, lakes, rivers, ocean, estuaries).

UNIT-IV (8 Hours)

Biodiversity and its conservation. Introduction-Definition: Genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

UNIT-V (6 Hours)

Environmental Pollution: Definition, Causes, effects and control measures of : Air pollution. Water pollution. Soil pollution. Marine pollution. Noise pollution. Thermal pollution. Nuclear hazards.

Solid wastes management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

Disaster management: floods, earthquake, cyclone and landslides.

UNIT-VI (6 Hours)

Social issues and the Environment: From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people : its problems and concerns. Case studies.

Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Preventation and Control of Pollution) Act. Water (Preventation and Control of Pollution) Act. Wildlife Protection Act. Forest conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-VII (4 Hours)

Human population and the Environment. Population growth, variation among nations. Population explosion-Family Welfare programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Woman and Child Welfare Role of Information Technology in Environment and human health. Case Studies.

Text Book:

1. Trivedi R.K. and P.K. Goel, Introduction to air pollution, techno Science Publications (TB).

Reference Books:

1. Aggarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India. Mapin Publishing Pvt. Ltd., India.
3. Burner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480 p.
4. Clark R.S. Marine Pollution, Slanderson Press Oxford (TB).
5. Conningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico pub. House, Mumbai, 1196 P.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Dawn to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993, Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press 473 p.

9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Waston, R.T. 1995, Global Biodiversity Assessment. Cambridge Uni. Press 1140p.

Theory Paper

Total: 100 Marks

External: 80 Marks

Internal: 20 Marks

External : 80 Marks

15 Question (MCQ): 1 marks each (1x15 = 15)
10 Question (Very Short 20-30 Words): 2 marks each (2x10 = 20)
5 Question (Short 50-70 Words): 3 marks each (3x5 = 15)
Answer any 5 out of 6 (Long 100 Words): 4 marks each (4x5 = 20)
Answer any 1 out of 2 (Very Long 150-200 Words): 10 marks each (10x1 = 10)

Internal : 20 Marks

Internal Exam: 8 Marks
Assignment : 6 Marks
Attendance : 3Marks
G.P. (General Proficiency) : 3 Marks

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C++ Programming Lab

Practical: 100 Marks

External: 80 Marks

Internal: 20 Marks

External (Two programs) : 80 Marks

Program Writing: 10 marks each (10x2 = 20)
Algorithm: 5 marks each (5x2 = 10)
Flowchart: 5 marks each (5x2 = 10)
Program execution: 15 marks each (15x2 = 30)
Viva: 10 marks

Internal : 20 Marks

Record: 4 Marks
Algorithm : 5 Marks
Flowchart : 5 Marks
Attendance : 3Marks
G.P. : 3 Marks

SQL Lab

Practical: 100 Marks

External: 80 Marks

Internal: 20 Marks

External (Two programs) : 80 Marks

Program Writing: 10 marks each (10x2 = 20)
Schema: 5 marks each (10x2 = 20)
Program execution: 15 marks each (15x2 = 30)
Viva: 10 marks

Internal : 20 Marks

Record: 4 Marks
Schema : 10 Marks
Attendance : 3Marks
G.P. : 3 Marks

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Syllabus for BCA

Semester 3

Theory										
S. No.	**Course Code**	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
1	BCA301	Operating System Concepts	4	1	0	5	70	30	0	100
2	BCA302	Data Structure Using C	4	1	0	5	70	30	0	100
3	BCA303	Computer Networks	4	1	0	5	70	30	0	100
4	BM301	Accounting & Financial Management	2	0	0	2	70	30	0	100
5	BCA304	Basics of UNIX Operating System	4	1	0	5	70	30	0	100
6	BCA391	Data Structures Using C Lab	0	0	5	5	0	30	70	100
7	BCA392	Introduction to Unix/ Linux Laboratory	0	0	5	5	0	30	70	100
Total						**32**	**350**	**210**	**140**	**700**

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Detailed Syllabus

OPERATING SYSTEM CONCEPTS

Code: BCA301

Max Marks: 70

Course Objectives: The course objectives for Operating System Concepts include understanding process and memory management, storage and I/O systems, and concurrency and synchronization. Students will learn about resource allocation, security, and distributed systems, with a focus on performance evaluation and optimization. Practical applications and case studies provide hands-on experience with different operating systems, such as Windows and Unix/Linux, to build a solid foundation in OS design and implementation.

UNIT I: (14 Hours)

Introduction: Definition of Operating System, Computer-System Organization, Computer System Architecture, Operating-System Structure, Operating System Structures: Operating- System Services, System Calls, Types of System Calls.

Process: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication, Threads: Overview, Multi core Programming, Multithreading Models, Threading Issues. CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT II: (8 Hours)

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.

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

UNIT III: (10 Hours)

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Background, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Mass-Storage Structure, Overview of Mass- Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Formatting, RAID Structure

UNIT IV: (12 Hours)

File-System Interface: File Concept, Access Methods, Directory and Disk Structure, Protection.

File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance.

I/O Systems: Overview, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.

UNIT V: (04 Hours)

Protection: Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of Access Rights, Capability Based Systems.

Security: The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication.

Text Book:

1. A.Tanenbaum, "Modern Operation Systems", Third Edition, Pearson Education, 2008.

Reference Books:

1. William Stallings, "Operating Systems", Fifth Edition, Pearson Education, 2005.
2. Ida M.Flynn, "Understanding Operating Systems", Sixth Edition, Cengage, 2011.
3. D.M.Dhamdhere, "Operating systems a concept based approach", Second Edition, McGraw-Hill, 2007
4. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts", Ninth Edition, John Wiley and sons publication, 2013.

DATA STRUCTURE USING C

Code: BCA302

Max Marks: 70

Course Objectives: The course aims to familiarize students with fundamental data structures such as arrays, linked lists, stacks, queues, trees, and graphs, utilizing the C programming language. Students will learn to implement these data structures efficiently, analyze their time and space complexities, and apply them to solve real-world problems. Through programming assignments and projects, students will develop proficiency in C programming and algorithmic thinking essential for software development and computer science applications.

UNIT -I (02 Hours)

Introduction to Data Structure and its Characteristics: Array Representation of single and multidimensional arrays; Sprase arrays – lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also.

UNIT -II (12 Hours)

Stacks and Queues: Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

UNIT-III (07 Hours)

Lists: Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers

UNIT-IV (07 Hours)

Trees: Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree

B-Trees: Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree

UNIT-V (10 Hours)

Sorting Techniques: Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear search, binary search and hashing

Text Book:

1. Kamthane: Introduction to Data Structures in C. Pearson Education 2005

Reference Books:

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education.
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures
5. E.Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education
7. Tenenbaum, Data Structures Using C. Pearson Education

DATA COMMUNICATION AND COMPUTER NETWORKING

Code: BCA303

Max Marks: 70

Course Objectives: The course aims to equip students with a comprehensive understanding of data communication and computer networking principles, including protocols, architectures, and security measures. Through hands-on exercises and theoretical learning, students will gain practical skills in network design, configuration, and troubleshooting, preparing them for roles in designing, implementing, and managing modern networks.

UNIT -I (9 Hours)

Introduction: Data Communication: components – Networks: distributed processing, network criteria – Protocols and Standards.

Basic Concepts: Line Configuration – Topology: Mesh, Star, Tree, Bus, Ring – Transmission Mode – Categories of Networks: LAN, MAN, WAN– Internetworks. The OSI Model: The Model – Functions of the Layers.

UNIT -II (12 Hours)

Transmission of Digital Data: Digital data transmission: Parallel, Serial – DTE-DCE interface: EIA 232 interface: mechanical, electrical and Functional Specification, Null modem – MODEMS.

Transmission media: Guided media: twisted pair cable, coaxial cable and fiber optic cable: propagation modes – Unguided media: propagation of radio waves, terrestrial microwave, satellite communication, cellular telephony – Transmission impairment: attenuation, distortion, noise – performance: throughput, propagation speed, propagation time.

UNIT-III (12 Hours)

Data Link Control: Line Discipline: ENQ/ ACK, Poll/Select - Flow Control: Stop- and- wait, Sliding Window – Error Control: Stop and wait ARQ, Sliding Window ARQ: Go-back-n and Selective reject.

Local Area Networks: Ethernet: 10BASE5, 10BASE2, 10BASE-T, IBASE5, Other Ethernet networks –Token Bus – Token Ring - FDDI.

UNIT-IV (15 Hours)

Switching: Circuit Switching: Space division switching, Time division switches – Packet Switching: datagram approach, Virtual Circuit approach – Message Switching.

Integrated Services Digital Network: B, D, and H channels, User Interfaces, Functional Grouping-The ISDN Layers – Broadband ISDN.

UNIT-V (12 Hours)

Transport Layer: Duties of the Transport Layer: End-to end delivery, Addressing, Reliable delivery, Flow control, Multiplexing – Connection – The OSI Transport Protocol: transport classes, TPDU, Connection- oriented and connectionless services.

Upper OSI Layers: Session Layer: Session and Transport Interaction, Synchronization points, Session Protocol data Unit – Presentation Layer- Functions: Translation, Encryption/ Decryption, Authentication, Compression – Application Layer: MHS, FTAM, VT, DS, CMIP

Text Book:

1. Stallings, Data and Computer Communications, 7/e, Pearson Education, 2003

Reference Books

1. Behrouz A. Forouzan. Data Communications and Networking. Tata McGraw-Hill Edition, Fourth Edition.
2. Andrew s. Tanenbaum .Computer Networks. Pearson Education .Fourth Edition.
3. Alberto Leon- Garcia and Indra Widjaja. Communication Networks- Fundamental Concepts and key Architectures. Tata Mcgraw-Hill. Second Edition.

ACCOUNTING AND FINANCIAL MANAGEMENT

Code: BM301

Max Marks: 70

Course Objectives: The course objectives for Accounting and Financial Management are to provide students with a comprehensive understanding of financial accounting principles, financial statement analysis, and managerial accounting techniques. Students will learn to prepare and interpret financial statements, develop budgeting and forecasting skills, and understand cost management and performance evaluation. Additionally, the course covers financial decision-making, investment analysis, and the impact of financial policies on business strategy and operations.

UNIT -I (18 Hours)

Introduction: Principles – Concepts & Conventions – Double entry system of accounting – Journal – Ledger. Preparation of trial balance. Subsidiary Books with special reference to simple cash book and three column cash book.

UNIT -II (12 Hours)

Final accounts of sole trader: adjusting entries, including reserve for bad debts, reserve for discount on debtors and creditors, preparation of final accounts.

UNIT-III (08 Hours)

Introduction: Meaning, scope, Functions of finance manager. Unit Costing: Preparation of cost sheet

UNIT-IV (12 Hours)

Ratio analysis: Meaning of ratio – Advantages – disadvantages – types of ratio – usefulness – liquidity ratios – profitability ratios, efficiency ratios, solvency ratios. (Theoretical concepts) Funds Flow Statement: Meaning – concepts of funds flow. Cash flow statement :Meaning ,need – simple problems on cash flow statement

UNIT V (10 Hours)

Marginal Costing: Meaning – Definition – Concepts in marginal costing – marginal equations – P / V ratio – B.E.P – Margin of safety – Sales to earn a desired profit – problems on above Budgetary control: Meaning – Definition – Preparation of flexible budget and cash budget

Text Book:

1. T.S Grewal - "Introduction to accounting", S. Chand & Company Limited

Reference Books:

1. M.C Shukla, T.S. Grewal, S.C. Gupta - "Advanced Accounts", S. Chand & Company Limited, 2006
2. S.N Maheshwari - " An introduction to Accountancy", Vikas Publishing House Pvt Limited, 2009
3. S.P Basu & M. Das: "Practice in Accountancy"
4. Rajasekaran V. – "Financial Accounting", Pearson Education India, 2011

BASICS OF UNIX OPERATING SYSTEM

Code: BCA304

Max Marks: 70

Course Objectives: The course aims to introduce students to the fundamental concepts of the UNIX operating system. Students will learn about the UNIX architecture, basic commands, file system structure, and shell scripting. The course also covers essential system administration tasks, providing a solid foundation for further studies in UNIX and Linux environments.

UNIT -I (10 Hours)

Working with UNIX-like Systems: Brief history of UNIX and LINUX, strengths and weaknesses of UNIX-like operating systems Basic concepts in UNIX-like systems: the kernel, shells, multiuser multitasking operation, remote access, file system, processes, environment and environment variables, the command line, online manual Using the vi editor – modes of operation and switching between them, text navigation, editing text, saving and quitting, using buffers (cut-copy-paste), pattern searching and replacement, undoing and repeating commands Basic commands related to handling files and the file system

UNIT -II (10 Hours)

The Bourne Again Shell (bash) Prompts, the command line, quoting and escaping, internal and external commands, the path, shell variables, basic command line processing Using the echo command A quick introduction to basic filters – cat and cut The building blocks approach Input/output redirection Command substitution

UNIT-III (10 Hours)

Introduction to Shell Scripting Shell scripts Fundamental shell programming constructs – conditional execution, loops, input and output, turning debugging on and off, etc.

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UNIT-IV (10 Hours)

Shell Scripting using Filters Definition of a filter Basic filters like the grep family, expr, sed, etc. Processing the output of commands like ls, ps, who, etc. Processing data in text files (fixed-width format and delimited format)

Text Book:

1. Das S. : Your UNIX – The Ultimate Guide, Tata McGraw-Hill, 2001.

Reference Books:

1. Kernighan B. W. and Pike R. : The Unix Programming Environment, Prentice-Hall of India, 1994.
2. Prata S. : Advanced Unix – A Programmer's Guide, BPB Publications, 1986

Theory Paper

Total: 100 Marks Time: 3 hours

External: 70 Marks

Internal: 30 Marks

External : 70 Marks

10 Question (MCQ): 1 marks each (1x10 = 10)
5 Question (Fill in the blanks): 1 marks each (1x5 = 5)
5 Question (Short 30-40 Words): 3 marks each (3x5 = 15)
Answer any 4 out of 6 (Long 50-75 Words): 4 marks each (4x4 = 16)
Answer any 2 out of 4 (Long 75-100 Words): 7 marks each (7x2 = 14)
Answer any 1 out of 2 (Very Long 150-200 Words): 10 marks each (10x1 = 10)

Internal : 30 Marks

Internal Exam: 15 Marks
(There will be two internal exams, each carrying 30 marks. The final mark will be determined by selecting the highest score from these two exams.)
Assignment : 8 Marks
Attendance : 4 Marks
G.P. (General Proficiency) : 5 Marks

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Data Structure Using C Lab

Practical: 100 Marks

External: 70 Marks

Internal: 30 Marks

External (Two programs) : 70 Marks

Program Writing: 10 marks each (10x2 = 20)
Algorithm & Flowchart : 10 marks each (10x2 = 20)
Program execution: 10 marks each (10x2 = 20)
Viva: 10 marks

Internal : 30 Marks

Program Writing: 5 marks
Algorithm & Flowchart : 5 marks
Program execution: 5 marks
Viva: 5 marks
Record: 5 marks
Attendance : 2 marks
Lab Discipline : 3 marks

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Introduction to Unix/Linux Lab

Practical: 100 Marks

External: 70 Marks

Internal: 30 Marks

External (Two programs) : 70 Marks

Program Writing: 10 marks each (10x2 = 20)
Schema: 5 marks each (10x2 = 20)
Program execution: 15 marks each (15x2 = 30)
Viva: 10 marks

Internal : 30 Marks

Record: 10 Marks
Practical Assessments/Lab Work : 10 Marks
Attendance : 5 Marks
G.P. : 5 Marks

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Syllabus for BCA

Semester 4

Theory										
Sl. No.	**Course Code**	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
1	BCA401	Web Technologies	4	0	0	4	70	30	0	100
2	BCA402	PC Assembly & Troubleshooting	4	0	0	4	70	30	0	100
3	BCA403	Software Engineering	4	0	0	4	70	30	0	100
4	MBA101	Organizational Behaviour	4	0	0	4	70	30	0	100
5	IC101	Indian Constitution	2	0	0	2	70	30	0	100
6	BCA491	Web Programming Lab	0	0	3	3	0	30	70	100
7	BCA492	PC Assembly & Troubleshooting Lab	0	0	3	3	0	30	70	100
Total						**24**	**350**	**210**	**140**	**700**

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Detailed Syllabus

WEB TECHNOLOGIES

Code: BCA401

Max Marks: 70

Course Objectives: The objective of the *Web Technologies* course is to equip students with the knowledge and skills required to design, develop, and maintain modern web applications. The course focuses on client-side and server-side technologies, emphasizing the principles of web development, responsive design, and emerging trends in web technologies.

UNIT I (07 Hrs)

Website Basics, HTML 5, CSS 3, WEB 2.0 Web Essentials: Clients, Servers and Communication – The Internet – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colours – Shadows – Text – Transformations – Transitions – Animations. Bootstrap Framework

UNIT II (06 Hrs)

Client Side Programming: Java Script: An introduction to JavaScript–JavaScript DOM Model-Exception Handling Validation- Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files.

UNIT III (05 Hrs)

Server Side Programming: Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- DATABASE CONNECTIVITY: JDBC. 121

UNIT IV (06 Hrs)

PHP and XML: An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions Form Validation. XML: Basic XML- Document Type Definition- XML Schema, XML Parsers and Validation, XSL

UNIT V (06 Hrs)

Introduction to Angular and Web Applications Frameworks: Introduction to AngularJS, MVC Architecture, Understanding attributes, Expressions and data binding, Conditional Directives, Style Directives, Controllers, Filters, Forms, Routers, Modules, Services; Web Applications Frameworks and Tools – Firebase- Docker- Node JSReact- Django- UI & UX.

Text Book:

1. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2011.
2. Jeffrey C and Jackson, Web Technologies A Computer Science Perspective, Pearson Education, 2011.
3. Angular 6 for Enterprise-Ready Web Applications, Doguhan Uluca, 1st edition, Packt Publishing

Reference Books:

1. Stephen Wynkoop and John Burke “Running a Perfect Website”, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

PC ASSEMBLY AND TROUBLESHOOTING

Code: BCA402

Max Marks: 70

Course Objectives: The objective of the *PC Assembly and Troubleshooting* course is to provide BCA students with practical knowledge and technical skills in assembling, configuring, maintaining, and troubleshooting personal computers. The course emphasizes understanding computer hardware components, diagnosing issues, and implementing effective solutions, preparing students for real-world IT support and hardware management roles.

UNIT I (06 Hours)

Brief history of computer on the basis Hardware. Computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to a computer as peripheral devices, different processors used for personal computers and notebook computers

UNIT II (06 Hours)

Perform installation, configuration, and upgrading of microcomputer/ computer: Hardware and software requirement, Assemble/setup microcomputer/ computer systems, accessory boards, types of motherboards, selection of right motherboard, Installation replacement of motherboard, troubleshooting problems with memory

UNIT III (08 Hours)

Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local area network, troubleshooting printer and scanner problems, troubleshooting hard drive problems. Drivers: Meaning, role and types.

UNIT IV (08 Hours)

Diagnose and troubleshooting of microcomputer/ computer systems hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device, managing faulty components. Booting and its types

Text Book:

1. PC Hardware: The Complete Reference, McGraw-Hills

Reference Books:

1. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer
2. PC Hardware: A Beginner's Guide by Ron Gilster

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

SOFTWARE ENGINEERING

Code: BCA403

Max Marks: 70

Course Objectives: The objective of the *Software Engineering* course is to provide BCA students with a comprehensive understanding of the principles, methodologies, and tools used in the development of high-quality software systems. The course focuses on the software development lifecycle, project management, and the application of engineering practices to ensure reliability, scalability, and maintainability of software.

UNIT I (08 Hours)

The Nature of Software, Need of Software Engineering, Prescriptive Process Models, Specialized Process Models, The Unified Process

UNIT II (06 Hours)

Role of a system analyst, SRS, Properties of a good SRS document, functional and non-functional requirements, Decision tree and Decision table, Formal Requirements Specification, Software Cost Estimation.

UNIT III (08 Hours)

Software design and its activities, Preliminary and detailed design activities, Characteristics of a good software design, Features of a design document, Cohesion and Coupling, Structured Analysis, Function Oriented Design, Object-Oriented Design.

UNIT IV (08 Hours)

Testing Fundamentals, Unit Testing, Integration Testing, Validation Testing, System Testing, Maintenance and Reengineering, Measures, Metrics, and Indicators, Software Measurement, Metrics for Requirements Model, Metrics for Design Model, Metrics for Testing, Metrics for Maintenance.

Text Book:

1. Software Engineering–A Practitioner's Approach, Roger S.Pressman, SeventhEdition, McGrawHill, 2010.

Reference Books

1. An Integrated Approach to Software Engineering, Pankaj Jalota, Third Edition,Narosa Publishing House, 2005
2. Software Engineering, Ian Sommerville, Ninth Edition, Addison-Wesley, 2011

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

ORGANIZATIONAL BEHAVIOUR

Code: MBA101

Max Marks: 70

Course Objectives: The objective of the *Organizational Behaviour* course is to provide students with an understanding of the dynamics of individual and group behaviour in organizational settings. The course emphasizes the development of interpersonal and managerial skills essential for effective collaboration, leadership, and decision-making within professional environments.

UNIT I (08 Hours)

Fundamentals of Organizational Behaviour: Nature, Scope, Definition and Goals of Organizational Behaviour; Fundamental Concepts of Organizational Behaviour; Models of Organizational Behaviour; Emerging aspects of Organizational Behaviour: Meaning Cultural Diversity, Managing the Perception Process

UNIT II (10 Hours)

Perception, Attitude, Values and Motivation: Concept, Nature, Process, Importance, Management Behavioural aspect of Perception. Effects of employee attitudes; Personal and Organizational Values; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive; Theories of Work Motivation: Maslow's Need Hierarchy Theory McGregcrs's Theory 'X' and Theory 'Y'

UNIT III (10 Hours)

Personality: Definition of Personality, Determinants of Personality; Theories of Personality- Trait and Type Theories, The Big Five Traits, Mytes-Briggs Indicator; Locus of Control, SType A and Type B Assessment of Personality

UNIT IV (08 Hours)

Work Stress: Meaning and definition of Stress, Symptoms of Stress; Sources of Stress: Individual Level, Group Level, Organizational Level; Stressors, Extra Organizational Stressors; Effect of Stress – Burnouts; Stress Management – Individual Strategies, Organizational Strategies; Employee Counselling

UNIT V (08 Hours)

Group Behaviour and Leadership: Nature of Group, Types of Groups; Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of Effective Leaders

UNIT VI (08 Hours)

Conflict in Organizations: Nature of Conflict, Process of Conflict; Levels of Conflict – Intrapersonal, Interpersonal; Sources of Conflict; Effect of Conflict; Conflict Resolution, Meaning and types of Grievances & Process of Grievances Handling.

Text Book:

1. Organizational Behaviour, India Edition, Nelson & Quick, Cengage learning.
2. Organisational Behaviour, S. Fayyaz Ahamed and others, Atlantic publisher.

Reference Books:

1. Robbins, S. P/ Judge, T. A/ Sanghi, S., Organizational Behavior, Pearson Publication
2. Aswathappa, K., Organisational Behaviour– Text and Problem, Himalaya Publication
3. Pardeshi, P. C., Organizational Behaviour & Principles & Practice Of Management, Nirali publication

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

INDIAN CONSTITUTION

Code: IC101

Max Marks: 70

Course Objectives: The objective of the *Indian Constitution* course is to provide the students with a foundational understanding of the principles, structure, and functioning of the Indian Constitution. The course emphasizes the rights and duties of citizens, governance frameworks, and the role of the Constitution in shaping the democratic and legal structure of India.

UNIT I (07 Hours)

Introduction to Constitution: Meaning and importance of the Constitution, salient features of Indian Constitution. Preamble of the Constitution. Fundamental rights- meaning and limitations. Directive principles of state policy and Fundamental duties -their enforcement and their relevance.

UNIT II (06 Hours)

Union Government: Union Executive- President, Vice-president, Prime Minister, Council of Ministers. Union Legislature- Parliament and Parliamentary proceedings. Union Judiciary-Supreme Court of India – composition and powers and functions.

UNIT III (07 Hours)

State and Local Governments: State Executive- Governor, Chief Minister, Council of Ministers. State Legislature-State Legislative Assembly and State Legislative Council. State Judiciary-High court. Local Government-Panchayat raj system with special reference to 73rd and Urban Local Self Govt. with special reference to74th Amendment.

UNIT IV (06 Hours)

Election provisions, Emergency provisions, Amendment of the constitution: Election Commission of India-composition, powers and functions and electoral process. Types of emergency-grounds, procedure, duration and effects. Amendment of the constitution- meaning, procedure and limitations.

Text Book:

1. M.V.Pylee, “Introduction to the Constitution of India”,4th Edition, Vikas publication,2005.
2. Durga Das Basu (DD Basu), “Introduction to the constitution of India”, (Student Edition), 19th edition, Prentice-Hall EEE, 2008

Reference Books:

1. Merunandan, “Multiple Choice Questions on Constitution of India”, 2nd Edition, Meraga publication,2007

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

WEB PROGRAMMING LAB

Code: BCA491
Max Marks: 70

(BASED ON BCA401) Web Technologies

Core Practical (Implement minimum 10 out of 15 practical)

1. Create your class time table using table tag.
2. Design a Webpage for your college containing description of courses, department, faculties, library etc. using list tags, href tags, and anchor tags.
3. Create web page using Frame with rows and columns where we will have header frame, left frame, right frame, and status bar frame. On clicking in the left frame, information should be displayed in right frame.
4. Create Your Resume using HTML, use text, link, size, colour and lists.
5. Create a Web Page of a super market using (internal CSS)
6. Use Inline CSS to format your resume that you have created.
7. Use External CSS to format your time table created.
8. Use all the CSS (inline, internal and external) to format college web page that you have created.
9. Write a HTML Program to create your college website using for mobile device.

Application Based Practical (Implement minimum 5 out of 10 practical)

1. Write an HTML/JavaScript page to create login page with validations.
2. Develop a Simple calculator for addiction, subtraction and multiplication and division operation using JavaScript.
3. Use Regular Expressions for validations in Login Page using JavaScript.
4. Write a Program to retrieve date from a text file and displaying it using AJAX.
5. Create XML file to store Student Information like Register Number, Name, Mobile Number, DOB, and Email-Id.
6. Create a DTD for (0).
7. Create XML scheme for (0).
8. Create XSL file to convert XML file to XHTML file.
9. Write a JavaScript program using Switch case.
10. Write a JavaScript program using any 5 events.
11. Write a JavaScript program using built in JavaScript objects.
12. Write program for populating values from JSON text.
13. Write a program to transform JSON text to a JavaScript object.

Note:

1. **In total 15 practical to be implemented. 2 additional practical may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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PC ASSEMBLY & TROUBLESHOOTING LAB

Code: BCA492

Max Marks: 70

List of Practical:

1. Assembling and De Assembling of Computer System
2. Loading and configuration procedure of Microsoft Client O/S Win XP /Win 7 and Windows 8
3. Installation of utility tools (Software)
4. Installation of utility tools (Drivers)
5. Firewall configuration, Antivirus/Internet security loading and configuration procedure
6. Installation and configuration of I/O devices – Printers, Webcams, Scanners.
7. Installation and configuration of I/O devices – Digital Camera, USB Wi-Fi, USB BT, USB Storages, Projectors
8. Multiple OS loading and trouble shooting

Theory Papers

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Internal Exam: 15 Marks
(There will be two internal exams, each carrying 30 marks. The final mark will be determined by selecting the highest score from these two exams.)
Assignment/Presentation: 5 Marks
Attendance: 5Marks
G.P. (General Proficiency): 5 Marks

ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

Syllabus for BCA

Semester 5

Theory										
Sl. No.	**Course Code**	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
1	BCA501	Programming in Python	4	0	0	4	70	30	0	100
2	BCA502	Java Programming	4	0	0	4	70	30	0	100
3	BCA503	Computer Graphics & Multimedia Application	3	1	0	4	70	30	0	100
4	BCA504	Optimization Techniques	4	0	0	4	70	30	0	100
5	BCA505	Minor Project	0	0	4	4	0	100	0	100
6	BCA591	Python Lab	0	0	3	3	0	30	70	100
7	BCA592	Java Programming Lab	0	0	3	3	0	30	70	100
		Total				**26**	**280**	**280**	**140**	**700**

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Detailed Syllabus

PROGRAMMING IN PYTHON

Code: BCA501
Max Marks: 70

Course Objectives: The objective of the *Programming in Python* course is to introduce the students to the fundamental concepts of Python programming. The course emphasizes problem-solving, programming constructs, data handling, and the use of Python libraries to develop efficient and scalable applications.

UNIT I (12 Hrs)

Introduction to Python Programming Language: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, Getting, Installing Python, Setting up Path and Environment Variables, Running Python, First Python Program, Python Interactive Help Feature, Python differences from other languages.

Python Data Types & Input/Output: Keywords, Identifiers, Python Statement, Indentation, Documentation, Variables, Multiple Assignment, Understanding Data Type, Data Type Conversion, Python Input and Output Functions, Import command.

Operators and Expressions: Operators in Python, Expressions, Precedence, Associativity of Operators, Non-Associative Operators.

UNIT II (10 Hrs)

Control Structures: Decision making statements, Python loops, Python control statements.

Python Native Data Types: Numbers, Lists, Tuples, Sets, Dictionary, Functions & Methods of Dictionary, Strings (in detail with their methods and operations).

UNIT III (12 Hrs)

Python Functions: Functions, Advantages of Functions, Built-in Functions, User defined functions, Anonymous functions, Pass by value Vs. Pass by Reference, Recursion, Scope and Lifetime of Variables.

Python Modules: Module definition, Need of modules, Creating a module, Importing module, Path Searching of a Module, Module Reloading, Standard Modules, Python Packages.

UNIT IV (10 Hrs)

Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.

File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, renaming & deleting files in Python, directories in Python.

Classes and Objects: The concept of OOPS in Python, Designing classes, Creating objects, Accessing attributes, Editing class attributes, Built-in class attributes, Garbage collection, Destroying objects.

Text Book:

1. Programming in Python, Pooja Sharma, BPB Publications, 2017.
2. Core Python Programming, R. Nageswara Rao, 2nd Edition, Dreamtech.

Reference Books:

1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

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JAVA PROGRAMMING

Code: BCA502
Max Marks: 70

Course Objectives: The *Java Programming* course is designed to introduce the students to the fundamental concepts of object-oriented programming using Java. It equips students with the skills to develop robust, secure, and platform-independent applications while understanding key programming paradigms and advanced Java features.

UNIT I (12 Hrs)

Java Basics: Java as Object-oriented Programming Language History of Java, Features of Java, Difference between Java and C++, Java Architecture (JDK, JVM, JRE), Java Tokens: Data types, Literals, Variables, Scope and lifetime of variables, Operators. Control Structures, Arrays.

Introducing Classes: Creating a Class: properties, methods and constructors. Object Access modifiers, Method Overloading, Garbage collection, this keyword, Static (variable, method, block), final keyword, Wrapper Classes, String class and methods.

UNIT II (12 Hrs)

Inheritance: Types, Super keyword, method overriding, covariant return type, abstract class.

Interfaces and Packages: Creation and implementing an interface, difference between abstract class and interface, Packages, and importing a package.

Exception Handling: Exception Class, built-in checked and unchecked exceptions, user-defined exceptions, use of try, catch, throw, throws, finally

UNIT III (10 Hrs)

Using I/O: Elementary concepts of Input/Output, using the byte streams, reading and writing using byte streams, automatically closing a file, using the character-based streams, File I/O using character streams (using a File Writer and using a File Reader)

Multi-threaded programming: Multithreading fundamentals, Thread class, and Runnable interface, the life cycle of thread, creation of single and multiple threads, implementation of Thread methods, Synchronization (using Synchronized methods, synchronized statement).

UNIT IV (10 Hrs)

Swings Fundamentals: Components (J Label and Image Icon, using swing Buttons (J Button, J Toggle Button, J Check Box, J Radio Button), J Text Field, J Scroll Pane, J List, J Combo Box) and Containers, Layout managers, event delegation Model, event handling (event sources, event listeners, event classes and interfaces, adapter classes).

JDBC: JDBC Architecture, JDBC Drivers, Connection, Statement, Prepared Statement, Result set, Connecting to the Database using JDBC.

Text Book:

1. Herbert Schildt, "Java 2 -The Complete Reference" – Tata McGraw Hill Education Private Limited, 2010
2. Trilochan Tarai, "Java Core Concepts and Applications", I.K. International Publishing house pvt. Ltd., 2015

Reference Books:

1. E. Balaguruswamy, "Programming with Java A Primer", McGraw Hill Education Private Limited, 5th
2. Herbert Schildt, Dale Skrien, "Java Fundamentals A Comprehensive Introduction" – Tata McGraw Hill Education Private Limited, 2013
3. Cay S. Horstmann, "Core Java Volume 1 – Fundamentals", 10th edition, Pearson, 2017

COMPUTER GRAPHICS & MULTIMEDIA APPLICATION

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

Code: BCA503
Max Marks: 70

Course Objectives: The objective of the *Computer Graphics & Multimedia Applications* course is to introduce the students to the principles, techniques, and applications of computer graphics and multimedia. The course focuses on the fundamentals of graphical systems, algorithms for image rendering, and multimedia tools, enabling students to design and develop visually appealing and interactive content.

UNIT I (11 hours)
Introduction: The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Application Development of Hardware and software for computer Graphics, Conceptual Framework for Interactive Graphics, Overview, Scan: Converting Lines, Scan Converting Circles, Scan Converting Ellipses.

UNIT II (11 hours)
Hardcopy Technologies, Display Technologies, Raster-Scan Display System, Video Controller, Random-Scan Display processor, Input Devices for Operator Interaction, Image Scanners, Working exposure on graphics tools like Dream Weaver, 3D Effects etc, Clipping Southland- Cohen Algorithm, Cyrus-Beck Algorithm, Midpoint Subdivision Algorithm

UNIT III (08 hours)
Geometrical Transformation: 2D Transformation, Homogeneous Coordinates and Matrix Representation of 2D Transformations, composition of 2D Transformations, the Window-to-Viewport Transformations, Introduction to 3D Transformations Matrix.

UNIT IV (08 hours)

Representing Curves & Surfaces: Polygon meshes parametric, Cubic Curves, Quadric Surface;
Solid Modelling: Representing Solids, Regularized Boolean Set Operation primitive Instancing Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry Comparison of Representations.

UNIT V (04 hours)
Introductory Concepts: Multimedia Definition, CD-ROM and the multimedia highway, Computer Animation (Design, types of animation, using different functions)

UNIT VI (04 hours)
Uses of Multimedia, Introduction to making multimedia – The stage of Project, hardware & software requirements to make good multimedia skills and Training opportunities in Multimedia Motivation for Multimedia usage

Text Book:

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & Practice, 2000, Pearson
2. Chennakesava R. Alavla “Computer Graphics”, PHI Learning Pvt. Limited

Reference Books:

1. The Indispensable PC Hardware Book (4th Edition) Hans-Peter Messmer
2. PC Hardware: A Beginner's Guide by Ron Gilster

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Tilthai, Dharmanagar, North Tripura

OPTIMIZATION TECHNIQUES

Code: BCA504
Max Marks: 70

Course Objectives: The *Optimization Techniques* course is designed to introduce the students to the fundamental concepts and methods used in optimization for solving real-world problems in diverse domains such as business, IT, and engineering. The course focuses on mathematical modelling, problem-solving techniques, and the use of computational tools to achieve optimal solutions.

UNIT I (12 hours)
Linear programming: Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.

UNIT II (08 Hours)
Queuing Theory: Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models(Model-I, Model-II).

UNIT III (08 Hours)
Replacement Theory: Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement

UNIT IV (10 Hours)
Inventory Theory: Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite.

UNIT V (08 Hours)
Job Sequencing: Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines

Text Book:

1. S. S. Rao, Engineering Optimisation: Theory and Practice , Wiley, 2008.
2. K. Deb, Optimization for Engineering design algorithms and Examples , Prentice Hall, 2nd edition 2012.

Reference Books:

1. C.J. Ray, Optimum Design of Mechanical Elements, Wiley, 2007.
2. R. Saravanan, Manufacturing Optimization through Intelligent Techniques, Taylor & Francis Publications, 2006.
3. D. E. Goldberg, Genetic algorithms in Search, Optimization, and Machine Learning, Addison-Wesley Longman Publishing, 1989.

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MINOR PROJECT

Code: BCA505
Max Marks: 100

PROJECT REPORT
All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT):
All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT
This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE:
This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION:
The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS:
The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION:
The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest. Bachelor of Computer Applications programme offered by USICT at affiliated institutions.

The following suggested guidelines must be followed in preparing the Minor Project Report:
Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

- Page Specification: (Written paper and source code)
- Left margin - 3.0cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom centre of the pages.

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Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing
Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.
Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. Coding Font size: 10, Courier New, Normal
Submission of Project Report to the University:
The student will submit his/her project report in the prescribed format. The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

I. Cover Page as per format
II. Acknowledgement
III. Certificate of the project guide
IV. Synopsis of the Project
V. Main Report
   a. Objective & Scope of the Project
   b. Theoretical Background Definition of Problem
   c. System Analysis & Design vis-a-vis User Requirements
   d. System Planning (PERT Chart)
   e. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance &Evaluation
   f. Detailed Life Cycle of the Project
      i. ERD, DFD
      ii. Input and Output Screen Design
      iii. Process involved
      iv. Methodology used testing
      v. Test Report, Printout of the Report & Code Sheet
VI. Coding and Screenshots of the project
VII. Conclusion and Future Scope
VIII. References

Formats of various certificates and formatting styles are as:

1. **Certificate from the Guide**

CERTIFICATE

This is to certify that this project entitled " xxxxxx xxxxx xxxx xxxx xxx" submitted in partial fulfilment of the degree of Bachelor of Computer Applications to the "xxxxxxxxxxxxxxxxxxxxxxxxxx" through xxxxxx xxxxx done by Mr./Ms. _____, Roll No. _____is an authentic work carried out by him/her at _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Signature of the student Signature of the Guide

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2. Project Report Cover Page Format:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

Submitted in partial fulfilment of the requirements for the award of the Degree of
Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)

Submitted to:
(Guide Name)

Submitted by:
(Student's name)
Roll No
College Name

3. Self-Certificate by the students

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled "……" is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications under the guidance of _____. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student
Name of the Student
Roll No.

4. ACKNOWLEDGEMENTS

In the "Acknowledgements" page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognize specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

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PYTHON LAB

Code: BCA591
Max Marks: 70

(BASED ON BCA501) Programming in Python

Core Practical (Implement minimum 10 out of 15 practical)

1. Write a program to find whether a number is a prime number.
2. Write a program to print m raise to power n, where m and n are read from the user.
3. Write a program having a parameterised function that returns True or False depending on whether the parameter passed is even or odd.
4. Write a program to print the summation of the following series upto n terms:1-2+3-4+5- 6+7 - - - - - -n
5. Write a menu driven program to perform the following operations on strings using string built in functions.
   a. Find the frequency of a character in a string.
   b. Replace a character by another character in a string.
   c. Remove the first occurrence of a character from a string.
   d. Remove all occurrences of a character from a string.
6. Write a program that accepts two strings and returns the indices of all the occurrences of the second string in the first string as a list. If the second string is not present in the first string, then it should return -1
7. Using Numpy module write menu driven program to do following
   a. Create an array filled with 1's.
   b. Find maximum and minimum values from an array
   c. Dot product of 2 arrays.
   d. Reshape a 1-D array to 2-D array.
8. Write a function that takes a sentence as input from the user and calculates the frequency of each letter. Use a variable of dictionary type to maintain the count.
9. Consider a tuple t1=(1,2,5,7,9,2,4,6,8,10). Write a program to perform following operations:
   a. Print contents of t1 in 2 separate lines such that half values come on one line and other half in the next line.
   b. Print all even values of t1 as another tuple t2.
   c. Concatenate a tuple t2=(11,13,15) witht1.
   d. Return maximum and minimum value from t1..
10. Write a function that reads a file file1 and copies only alternative lines to another file file2. Alternative lines copied should be the odd numbered lines.
11. Write a Python program to handle a Zero Division Error exception when dividing a number by zero.
12. Write a program that reads a list of integers from the user and throws an exception if any numbers are duplicates.
13. Write a program that makes use of a function to display sine, cosine, polynomial and exponential curves.
14. Take as input in the months and profits made by a company ABC over a year. Represent this data using a line plot. Generated line plot must include X axis label name = Month Number and Y axis label name = Total profit.
15. Write a program to Create a CSV file by entering user-id and password, read and search the password for given user id

Note:

1. **In total 10 practical to be implemented. 2 additional practical may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

JAVA PROGRAMMING LAB

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

Code: BCA592
Max Marks: 70

(BASED ON BCA502) Java Programming

Core Practical (Implement minimum 10 out of 15 practical)

1. Write a program declaring a class Rectangle with data member's length and breadth and member functions Input, Output and CalcArea.
2. Write a program to demonstrate use of method overloading to calculate area of square, rectangle and triangle.
3. Write a program to demonstrate the use of static variable, static method and static block.
4. Write a program to demonstrate concept of ``this``.
5. Write a program to demonstrate multi-level and hierarchical inheritance.
6. Write a program to use super() to invoke base class constructor.
7. Write a program to demonstrate run-time polymorphism.
8. Write a program to demonstrate the concept of aggregation.
9. Write a program to demonstrate the concept of abstract class with constructor and ``final`` method.
10. Write a program to demonstrate the concept of interface when two interfaces have unique methods and same data members.
11. Write a program to demonstrate checked exception during file handling.
12. Write a program to demonstrate unchecked exception
13. Write a program to demonstrate creation of multiple child threads.
14. Write a program to use Byte stream class to read from a text file and display the content on the output screen.
15. Write a program to demonstrate any event handling.

Application Based Practical (Implement minimum 5 out of 10 practical)

16. Create a class employee which have name, age and address of employee, include functions getdata() and showdata(), getdata() takes the input from the user, showdata() display the data in following format:

    Name:
    Age:
    Address:
17. Write a Java program to perform basic Calculator operations. Make a menu driven program to select operation to perform (+ - * /). Take 2 integers and perform operation as chosen by user.
18. Write a program to make use of Buffered Stream to read lines from the keyboard until 'STOP' is typed.
19. Write a program declaring a Java class called Savings Account with members ``account Number`` and ``Balance``. Provide member functions as ``deposit Amount ()`` and ``withdraw Amount ()``. If user tries to withdraw an amount greater than their balance then throw a user-defined exception.
20. Write a program creating 2 threads using Runnable interface. Print your name in ``run ()`` method of first class and "Hello Java" in ``run ()`` method of second thread.
21. Write program that uses swings to display combination of RGB using 3 scrollbars.
22. Write a swing application that uses at least 5 swing controls
23. Write a program to implement border layout using Swing.
24. Write a java program to insert and update details data in the database.
25. Write a java program to retrieve data from database and display it on GUI.

Note:

1. **In total 15 practical to be implemented. 2 additional practical may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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Theory Papers

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

Time: 3 hours

External: 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Internal Exam: 15 Marks
(There will be two internal exams, each carrying 30 marks. The final mark will be determined by selecting the highest score from these two exams.)
Assignment/Presentation: 5 Marks
Attendance: 5 Marks
G.P. (General Proficiency): 5 Marks

ARYAVART INTERNATIONAL UNIVERSITY

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Syllabus for BCA

Semester 6

Theory										
Sl. No.	**Course Code**	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
1	BCA601	Computer Network Security	4	0	0	4	70	30	0	100
2	BCA602	Information System: Analysis Design & Implementation	4	0	0	4	70	30	0	100
3	BCA603	E-Commerce	4	0	0	4	70	30	0	100
4	BCA604	Data Warehouse and Data Mining	4	0	0	4	70	30	0	100
5	BCA605	Major Project	0	0	8	8	0	100	0	100
6	BCA691	Presentation/Seminar based on Major Project	0	0	2	2	0	100	0	100
		Total				**26**	**280**	**320**	**0**	**600**

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Tilthai, Dharmanagar, North Tripura

Detailed Syllabus

COMPUTER NETWORK SECURITY

Code: BCA601
Max Marks: 70

Course Objectives: The *Computer Network Security* course equips the students with the knowledge and skills required to programming language– C. The course emphasizes understanding the basic structure of a C program, gain knowledge of various programming errors, enable the students to make flowchart and design an algorithm for a given problem and enable the students to develop logics and programs.

UNIT I (12 Hrs)

Introduction: Attack, Services and Mechanism, Model for Internetwork Security. Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication

UNIT II (10 Hrs)

Network Security: Authentication Application: Kerveros, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

UNIT III (12 Hrs)

IP security Architecture: Overview, Authentication header, Encapsulating Security Pay Load combining Security Associations, Key Management.

UNIT IV (10 Hrs)

Web Security: Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

UNIT V (06 Hrs)

Network Management Security: Overview of SNMP Architecutre-SMMPVI1 Communication Facility, SNMPV3.

UNIT VI (08 Hrs)

System Security: Intruders, Viruses and Relate Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management.

Text Book:

1. Programming in Python, Pooja Sharma, BPB Publications, 2017.
2. Core Python Programming, R. Nageswara Rao, 2nd Edition, Dreamtech.

Reference Books:

1. Python, The complete Reference, Martin C. Brown, Mc Graw Hill Education.
2. Python in a Nutshell, A. Martelli, A. Ravenscroft, S. Holden, OREILLY.

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INFORMATION SYSTEM: ANALYSIS DESIGN AND IMPLEMENTATION

Code: BCA602
Max Marks: 70

Course Objectives: The *Information System Analysis, Design, and Implementation* course equips the students with the knowledge and skills required to analyze, design, and implement information systems. The course emphasizes understanding system requirements, applying structured and object-oriented analysis techniques, and implementing efficient systems to solve organizational problems.

UNIT I (12 Hrs)
Overview of System Analysis and Design: Systems Development Life Cycle; concept and Models: requirements determination, logical design, physical design, test planning, implementation, planning and performance evaluation, communication, interviewing, presentation skills; group dynamics; risk and feasibility analysis; group based approaches, JAD, structures walkthroughs, and design and code reviews; prototyping; database design software quality metrics; application categories software package evaluation and acquisition.

UNIT II (08 Hrs)
Information Requirement Analysis: Process modeling with physical logical data flow diagrams, data modeling with logical entity relationship diagrams.

UNIT III (10 Hrs)
Developing a Proposal: Feasibility study and cost estimation.
System Design: Design of input and control, design of output and control, file design/database design, process, user interface design, prototyping; software constructors; documentation.

UNIT IV (12 Hrs)
Application Development Methodologies and CASE tools: Information engineering structured system analysis and design, and object oriented methodologies for application development data modeling, process modeling, user interface design, and prototyping, use of computer aided software engineering (CASE) tools in the analysis design and implementation of information systems.

UNIT V (10 Hrs)
Design and Implementation on OO Platform: Object oriented analysis and design through object modeling technique, object modeling, dynamic modeling and functional object oriented design and object oriented programming systems for implementation, object oriented data bases.

UNIT VI (10 Hrs)
Managerial issues in Software Projects: Introduction to software markets; planning of software projects, size and cost estimates; project scheduling; measurement of software quality and productivity, ISO and capability maturity models for organizational growth.

Text Book:

1. T. Haryszkiewycz, Introduction of System Analysis and Design, Pearson Education, (PHI) 1998.
2. V. Rajaraman, Analysis and Design of Information System, Pearson Education, 1991.

Reference Books:

1. System Analysis and Design Methods, Whitten, Bentaly and Barlow, Galgotia Publication.
2. System Analysis and Design Elias M. Award, Galgotia Publication
3. Modern System Analysis and Design, Jeffrey A. Hofer Joey F. George Joseph S. Valacich Addison Weseley.

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E-COMMERCE

Code: BCA603
Max Marks: 70

Course Objectives: The *E-Commerce* course introduces the students to the fundamentals of electronic commerce, its infrastructure, technologies, and business models. The course equips students with the knowledge to design and implement e-commerce solutions while understanding the legal, security, and operational aspects of online businesses.

UNIT I (10 Hours)
Introduction: Definition of Electronic Commerce, Evolution of e-commerce, E-Commerce& E Business, Unique features of e-commerce, applications of E-Commerce, advantages and disadvantages of E-commerce, Types of ecommerce:B2B, B2C, C2C, M-commerce, Social Commerce.
E-commerce infrastructure: Technological building blocks: Internet, web and mobile applications.

UNIT II (10 Hours)
Building an e-commerce presence: Planning, System Analysis, Design, Choosing Software, Hardware, Other Ecommerce site tools: Tools For website design, Tools for SEO, Interactivity and active contents (Server side scripting).
Important Components of E-commerce website: Product Cataloguing, Product Listing Page, Product description Page, Cart building and Checkout, Third party integrations: Payment systems, Data Layer Integrations for analytics, Customer support integration, Order tracking, Shipping, return and cancellation.
New Technologies for E-commerce: Chatbots, Recommendation systems (Personalisation), Smart Search, Product Comparison, Augmented reality, Big data, Cloud computing.

UNIT III (10 Hours)
Electronic Payment Systems: Overview of Electronics payments, electronic Fund Transfer, Digital Token based Electronics payment System, Smart Cards, Credit Cards, Debit Cards, Emerging financial Instruments Smartphone wallet, Social / Mobile Peer to Peer Payment systems, Digital Cash and Virtual Currencies, Online Banking, Payment Gateway, Electronic Billing Presentment and Payment.

UNIT IV (10 Hours)
Security Threats and Issues: Cyber crimes, Credit card frauds/theft, Identity fraud, spoofing, sniffing, DOS and DDOS attacks, Social network security Issues, Mobile Platform Security issues, Cloud security issues.
Technology Solutions: Encryption: Secret Key Encryption, Public Key Encryption, Digital Certificates and public key infrastructure.
Securing channels: Secured Socket Layer (SSL), Transport Layer Security (TLS), Virtual Private Network (VPN), Protecting Networks: Firewalls, Proxy Servers, Intrusion detection and protection systems, Anti Virus software.

Text Book:

1. Kenneth C. Laudon, "E-Commerce: Business, Technology and Society", 15th Edition, Pearson education.
2. KK Bajaj & Debjani Nag," E-Commerce: The Cutting Edge of Business "McGraw Hill, II edition, 2015.
3. Efraim Turban, Jae Lee, David King, H. Michael Chung, "Electronic Commerce – A Managerial Perspective", Addison-Wesley.

Reference Books:

1. The Complete Reference: Internet, Margaret Levine Young, Tata McGraw Hill.
2. E-Commerce: Concepts, Models, Strategies, CSV Murthy, Himalayas Publishing House.
3. Frontiers of Electronic Commerce, Ravi Kalakota & Andrew B. Wilson, Addison-Wesley (An Imprint of Pearson Education).
4. Network Security Essentials: Applications & Standards, William Stallings, Pearson Education.

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DATA WAREHOUSE AND DATA MINING

Code: BCA604
Max Marks: 70

Course Objectives: The *Data Warehousing and Data Mining* course introduces the students to the principles and practices of storing, managing, and analyzing large datasets. The course emphasizes the design and development of data warehouses, as well as the techniques and tools used to extract useful patterns and insights through data mining.

UNIT I (12 Hours)

Introduction to Data Warehousing: Overview, Difference between Database System and Data Warehouse, The Compelling Need for data warehousing, Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, three tier architecture, Metadata in the data warehouse.
ETL tools: Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope and content.

UNIT II (11 Hours)

Principles of Dimensional Modelling: Objectives, From Requirements to data design, Multi-Dimensional Data Model, Schemas: the STAR schema, the Snowflake schema, fact constellation schema.
OLAP in the Data Warehouse: Demand for Online Analytical Processing, limitations of other analysis methods, OLAP definitions and rules, OLAP characteristics, major features and functions, hyper cubes.
OLAP Operations: Drill-down and roll-up, slice-and-dice, pivot or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, the DOLAP model, ROLAP versus MOLAP, OLAP implementation considerations. Query and Reporting, Executive Information Systems (EIS), Data Warehouse and Business Strategy.

UNIT III (10 Hours)

Data mining and data pre-processing:
Data mining: Introduction, What kind of data can be mined, what kind of patterns to be mined, which technologies are used, what kinds of applications are targeted, Major issues in data mining.
Data pre-processing: Overview of Data pre-processing, data cleaning, data integration, data reduction, data transformation and data discretization, exploring data using IRIS datasets. Introduction to apriori algorithm for association mining rule.

UNIT IV (10 Hours)

Data mining applications and Data mining Tools:
Applications of data mining: Data mining for retail and telecommunication industries, data mining and recommender systems.
Introduction to data mining tools (open source): Weka, RapidMiner, IBM Watson for classification and clustering algorithms using IRIS Datasets

Text Book:

1. Kamber and Han, “Data Mining Concepts and Techniques”, Third edition, Hartcourt India P.Ltd., 2012.
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, “Introduction to data mining”, Pearson education, 2006.
3. Paul Raj Poonia, “Fundamentals of Data Warehousing”, John Wiley & Sons, 2004.

Reference Books:

1. Ashok N. Srivastava, Mehran Sahami, “Text Mining Classification, Clustering, and Applications”, Published by Chapman and Hall/CRC1st Edition, June 23, 2009
2. Ian H., Eibe Frank, Mark A. Hall, Christopher Pal “Data Mining: Practical Machine Learning Tools and Techniques” Published by Morgan Kaufmann; 4th edition, December 1, 2016
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, PHI, 2006
4. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw Hill, 1 July 2017
5. Shmueli, “Data Mining for Business Intelligence : Concepts, Techniques and Applications in Microsoft Excel with XLMiner”, Wiley Publications

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MAJOR PROJECT

Code: BCA605
Max Marks: 70

PROJECT REPORT
All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT):
All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT-
This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE:
This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION:
The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS:
The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION:
The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final Project Report:
Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

- Page Specification: (Written paper and source code)
- Left margin - 3.0cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom centre of the pages.

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Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing
Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.
Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing.
Coding Font size: 10, Courier New, Normal
Submission of Project Report to the University: The student will submit his/her project report in the prescribed format. The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

I. Cover Page as per format
II. Acknowledgement
III. Certificate of the project guide
IV. Synopsis of the Project
V. Main Report
    i. Objective & Scope of the Project
    ii. Theoretical Background Definition of Problem
    iii. System Analysis & Design vis-a-vis User Requirements
    iv. System Planning (PERT Chart)
    v. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance &Evaluation
    vi. Detailed Life Cycle of the Project
        a. ERD, DFD
        b. Input and Output Screen Design
        c. Process involved
        d. Methodology used testing
        e. Test Report, Printout of the Report & Code Sheet
VI. Coding and Screenshots of the project
VII. Conclusion and Future Scope
VIII. References

Formats of various certificates and formatting styles are as:

1. Certificate from the Guide

CERTIFICATE

This is to certify that this project entitled " xxxxxx xxxxx xxxxx xxxx xxxx xxx" submitted in partial fulfilment of the degree of Bachelor of Computer Applications to the "xxxxxxxxxxxxxxxxxxxxxxxxxx" through xxxxxx xxxxx doneby Mr./Ms. _____, Roll No. _____ is an is an authentic work carried out by him/her at _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Signature of the student Signature of the Guide

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2. Project Report Cover Page Format:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

Submitted in partial fulfilment of the requirements for the award of the Degree of
Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)

Submitted to:
(Guide Name)

Submitted by:
(Student's name)
Roll No:
College Name:

3. Self-Certificate by the students

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled "……" is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications under the guidance of _____. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student
Name of the Student
Roll No.

4. ACKNOWLEDGEMENTS

In the "Acknowledgements" page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognize specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

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PRESENTATION/SEMINAR BASED ON MAJOR PROJECT

Code: BCA691
Max Marks: 70

OBJECTIVE:
Seminars/Conferences and Presentations provide a platform to the students, where they can learn from what others are doing, learn about new things, ideas and important tips related to new technologies. To foster the Innovations happening in upcoming technologies and harnessing the entrepreneurial opportunities, Institutes must provide ample opportunities to the students to learn and yield the advantages of new advancements in the field of technology. It is expected from a student to learn latest in the industry and write an article related to it and present their findings in front of a panel.

The following points need to considered while planning and evaluating the presentation

- The seminars must be conducted after every 15 days/ or a month. A minimum of 3-4 seminar sessions can be organized during the semester.
- A minimum of 7-8 slides must be there which would include the title slide. The first slide should be the Introduction slide and the last one reference slide wherein all the links/books references/paper reference to paper must be quoted. The rest of the slides should focus on the technology, application areas etc.
- The title of the seminar must be related to the field of Information technology and must talk about the latest innovation/technology like IOT, Machine learning, Deep learning, AI Cloud computing, Mobility, Hand held devices, Social Computing, NOSQL Database, CRM, Social CRM, Open Source Application Development Frameworks, Zero Trust Security Framework/ Architecture, Big Data/ Data Lake, Emerging and Innovative Technologies, Conversational AI, Sentiments Analysis, DevOps, Real time Analytics, Fraud Detection. Proper approval must be taken before starting the work.
- Student's feedback must be taken after taking the seminar as to what learning they have gathered after studying the topics. For this, a feedback form may be designed using Google form utility.

Theory Papers

Total: 100 Marks Time: 3 hours
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Internal Exam: 15 Marks
(There will be two internal exams, each carrying 30 marks. The final mark will be determined by selecting the highest score from these two exams.)
Assignment/Presentation: 5 Marks
Attendance: 5Marks
G.P. (General Proficiency): 5 Marks