ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

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

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

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