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SYLLABUS (CBCS)

BCA Semester III : (THREE)

DATA AND FILE STRUCTURE USING C

Code No : BCA301

Effective from June 2012

BCA301 – DATA AND FILE STRUCTURE USING C

INTRODUCTION: (5%)
Data Structure and its classification (Primitive, non-primitive: linear, non-linear)

ARRAYS: (10%)
Array concept (one dimension, two dimension), Memory representation of single dimension array & two dimension array (row major, column major), Operations for one dimension array (insertion, deletion, traversal), Sparse matrix, Memory representation of sparse matrix (vector notation).

SEARCHING AND SORTING: (15%)
Sequential search, Binary search, Comparison in terms of efficiency, Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort, Comparison in terms of their efficiency.

STACKS AND QUEUES: (25%)
Properties of stacks, Stack representation using array, Stack operations (push, pop, peep, and change), and applications of stack (recursion, evaluating arithmetic expression: conversion from infix to postfix notation, evaluating postfix expression)
Properties of queues, Circular queue, Priority queue, Double ended queue, Queue representation using array, Queue operations (insert, delete), Applications of queue (CPU scheduling in multiprogramming environment, Round Robin algorithm)

LINKED LISTS: (15%)
Singly linked lists, Doubly linked list, Circular linked list, Header linked list, Operations of linked list (insertion, deletion, traversal, split, join), Application of linked list (Representation of polynomial and its addition, Dynamic storage management).

TREES: (30%)
Definition, Binary trees and its properties, Binary search tree, Representation of tree using array and linked list, Operations on binary trees (creation, traversal: preorder, post order, inorder, converse preorder, converse inorder, converse postorder, search, deletion), Applications of binary trees, Threaded binary tree, Heap tree (insert and delete operations, heap sort), B-trees (indexing and search operation), AVL trees (representation and AVL rotations), Expression tree (evaluation), Forests (introduction).

TEXT BOOK:
- Classical Data Structure, D. Samanta, PHI
- Data Structures, schaum's Outlines, Adapted by G A PAI

REFERENCE BOOKS:
- Data Management and File Structure, Mary, E. S. Loomis, PHI

PATTERN OF QUESTION PAPER

BCA301 – DATA AND FILE STRUCTURE USING C
Total Marks : 60 , Duration : TWO Hours
Passing standard: 24 Marks

* There are four questions.
* Each question carries equal marks (i.e. 15)

Total Marks: 60

Q.1 (A) Answer any five (two or three line answers, 5 out of 7) (5 * 2marks) [10]
Q.1 (B) Short Note (1out of 2) (1* 5marks) [5]

Q.2. (A) Attempt any three (3 out of 5) (3 * 3marks) [9]
Q.2 (B) Write Algorithm (1 out of 2) (1* 6marks) [6]

Q.3 Attempt any three (3 out of 5) (3 * 5marks) [15]

Q.4 Questions on writing C programs/algorithms (2 out of 4) (2 * 7.5marks) [15]

BCA302 – OBJECT ORIENTED PROGRAMMING WITH C++

PRINCIPLES OF OBJECT ORIENTED PROGRAMMING (10%)
Procedure – oriented programming, Object oriented programming paradigm, Basic concepts of object oriented Programming, Benefits of object oriented programming, Application of object oriented programming, What is c++?, Application of c++, Input/output operators, Structure of c++ program

TOKENS, EXPRESSIONS AND CONTROL STATEMENTS (10%)
Tokens : keywords, identifiers, basic data types, user defined types, derived data types, symbolic constants, type compatibility, declaration of variables, dynamic initialization of variables, reference variables
Operators in C++: scope resolution operator, member referencing operator, memory management operator, manipulators, type cast operator.
Expression : Expression and their types, special assignment operator, implicit conversions, operator precedence
Conditional control structure: simple if, if…else, if…else if ladder, nested if, switch etc.
Looping control structure: for, while , do…while

FUNCTIONS IN C++ (10%)
The main function, Function prototype, Call by reference, Return by reference, Inline function, Default arguments, Const arguments, Functions overloading

CLASSES AND OBJECTS (15%)
C structures revisited, Specifying a class, Defining member functions, nesting of Member functions, private member function, making outside function inline, Arrays within a class, Memory allocation for objects, Static data member, Static member functions, Arrays of objects, Objects as function arguments, Friendly functions, Returning objects, Const member function, Pointer to members

CONSTRUCTOR AND DESTRUCTOR (10%)
Characteristics of constructor, Parameterized constructor, Multiple constructor in a class, Constructor with default argument, Copy constructor, Dynamic initialization of objects, Constructing two dimensional array, Dynamic constructor, Destructors

OPERATOR OVERLOADING AND TYPE CONVERSION (15%)
Concept of operator overloading, Over loading unary and binary operators, Overloading of operators using friend Function, Manipulation of string using operators, Rules for operator overloading, Type conversions.

INHERITANCE (10%)
Defining derived classes, Types of inheritance (Single, Multiple, Multi-level, Hierarchical, Hybrid), Virtual base class & Abstract class, Constructors in derived class, Nesting of classes.

POINTER, VIRTUAL FUNCTIONS AND POLYMORPHISM **(5%)**
Pointer to Object, Pointer to derived class, this pointer, Rules for virtual function, Virtual function and pure virtual function.

WORKING WITH FILES **(15%)**
File stream classes, Opening and closing a file, Error handling, File modes, File pointers, Sequential I/O operations, Updating a file (Random access), Command line arguments

Text Books:
- Object Oriented Programming in C++ - E.Balagurusamy, BPB

Reference Books:
- Mastering C++ - Venugopal
- Object Oriented Programmin in C++ - Robaret Laphore
- Let us C++ - Yashvant Kanitkar, BPB

PATTERN OF QUESTION PAPER

BCA302 – OBJECT ORIENTED PROGRAMMING WITH C++
Total Marks : 60 , Duration : TWO Hours
Passing standard: 24 Marks

* There are four questions.
* Each question carries equal marks (i.e. 15)

Total Marks: 60

Q.1 (A) Answer any five (two or three line answers, 5 out of 7) (5 * 2marks)   [10]
Q.1 (B) Short Note (1out of 2) (1* 5marks)   [5]

Q.2. (A) Attempt any three (3 out of 5) (3 * 3marks)   [9]
Q.2 (B) Descriptive question (1 out of 2) (1* 6marks)   [6]

Q.3 (A) Short Notes (3 * 4marks)   [12]
Q.3 (B) Questions on finding errors or output of in given code (2 out of 3) (2 * 1.5marks) [3]

Q.4 Questions on writing C++ programs (2 out of 4) (2 * 7.5marks)   [15]

BCA303 – MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

CONNECTIVES   **(10%)**
Introduction, Objectives, Statements, Connectives, Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Equivalence of formulae and well-formed formulae, Two state devices, Gate and module, Two level networks, NOR and NAND gates.

NORMAL FORMS AND THE THEORY OF INFERENCES   **(20%)**
Introduction, Disjunctive normal forms, Conjunctive normal forms, Principal disjunctive forms, Principal conjunctive forms, Valid inferences using truth table and direct method of proof, Rules of inference (rule p, t and cp), Implications, Equivalence, Consistency of premises and indirect method of proof

MATRICES   **(20%)**
Algebraic operations (Multiplication) computations of inverse, Rank of matrix, Solution of simultaneous Linear equations, Cramer's Rule, Gauss elimination method, Matrix inversion method.

GRAPH THEORY   **(20%)**
Introduction to Graph, abstract definition of graph, terms related to graph, Isomorphism, mtrix representation of graphs, Path, Reachability, Connectedness, Node base.

POSETS AND LATTICES   **(10%)**
Introduction, Posets, Lattices as Posets, Lattices as algebraic systems, Sublattices, Complete Lattices, Bounds of Lattices, Modular and distributive lattices, Complemented Lattice, Chains.

BOOLEAN ALGEBRA   **(20%)**
Introduction, Definition and important properties, Subboolean Algebra, Atoms, Anti toms Irreducible, Stone's representation theorem(without proof),Boolean Expression and their equivalence, Min terms and max terms, Values of Boolean expressions and Boolean Functions.

Text Books:
- Discrete Mathematics, Schaun's Series

Refeerence Books:
- Discrete Mathematical Structure (Third Edition), Bernard Kolman, Robert C. Busby, Sharon Roass, Prentice Hall Of India Pvt. Ltd.
- Discrete Mathematics And Its Applications, Tata Mcgraw Hill, Kenneth .H. Rosen
- Discrete Mathematical Structures With Applications To Computer Science, J. P. Tremblay And R. Manohor, Mcgraw Hill, New Delhi.

PATTERN OF QUESTION PAPER

BCA303 – MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
Total Marks : 60 , Duration : TWO Hours
Passing standard: 24 Marks

* There are four questions.
* Each question carries equal marks (i.e. 15)

Total Marks: 60

Q.1. (A) Define the following terms. (6 out of 6) (6 * 1marks)   [6]
Q.1. (B) Any three sums (3 out of 5) (3 * 3marks)   [9]

Q.2. (A) long sum question   [5]
                    OR
Q.2. (A) long sum question
Q.2. (B) Any four questions (4 out of 5) (4 * 2.5marks)   [10]

Q.3. (A) two or three lines question (3 out of 5) (3 * 2marks)   [6]
Q.3. (B) Attempt any three questions (3 out of 5) (3 * 3marks)   [9]

Q.4. long sum questions (3 out of 5) (3 * 5marks)   [15]

BCA304 – SQL AND PL/SQL

SQL, SQL*PLUS **(5%)**
Introduction to SQL, SQL Commands and Datatypes, Operators and Expressions

MANAGING TABLES AND DATA **(30%)**
Creating and Altering tables (Including constraints), Data Manipulation Command like Insert, update, delete, SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL, BETWEEN, EXISTS, LIKE, Joins, subquery, Built in functions

OTHER ORACLE DATABASE OBJECTS **(10%)**
View, Sequence, Synonyms, Database Links, Index, Cluster , Snapshot

DATA CONTROL AND TRANSACTION CONTROL COMMAND **(5%)**
Grant, Revoke, Role, Creating Users, What is transaction?, Starting and Ending of Transaction, Commit, Rollback, Savepoint

INTRODUCTION TO PL/SQL **(25%)**
SQL v/s PL/SQL, PL/SQL Block Structure, Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.), %TYPE and %ROWTYPE, Using Cursor(Implicit, Explicit)

STORED PROCEDURES/FUNCTIONS **(10%)**
What are procedure and functions?, Storage and advantages, Creating and using stored procedures and functions

DATABASE TRIGGERS **(15%)**
Introduction and use, Database triggers v/s procedures, Database triggers v/s integrity constraints, Types of triggers, Creating and deleting triggers

Text Books:
- SQL,PL/SQL The programming - Lang.Of Oracle, Ivan Bayross - BPB

Reference Books:
- Using Oracle 8i - Page, Hughes - QUE & PHI Publications
- Oracle 8I The Complete Reference - George Koch, Kevin Loney -Oracle Press and Tata MacGraw-Hill

PATTERN OF QUESTION PAPER

BCA304 – SQL AND PL/SQL
Total Marks : 60 , Duration : TWO Hours
Passing standard: 24 Marks

* There are four questions.
* Each question carries equal marks (i.e. 15)

Total Marks: 60

Q.1 (A) Answer any five (two or three line answers, 5 out of 7) (5 * 2marks)   [10]
Q.1 (B) Short Note (1out of 2) (1* 5marks)   [5]

Q.2. (A) Attempt any three (3 out of 5) (3 * 3marks)   [9]
Q.2 (B) Questions to write database queries on given sample database   [6]

Q.3 (A) Short Notes (3 * 4marks)   [12]
Q.3 (B) Short question on cursors.   [3]

Q.4 Questions on writing procedure/function/trigger (3 out of 5) (3 * 5marks)   [15]

BCA305L – PRACTICAL LAB

Practical will be based on BCA301, BCA302 and BCA304.

PATTERN OF PRACTICAL EXAMINATION
Total Marks : 100 , Duration : THREE Hours
Passing standard: 40 Marks

BCA305L – PRACTICAL LAB

Total Marks: 100

Q.1 Practical Question(s) From BCA301   [25]
Q.2 Practical Question(s) From BCA302   [25]
Q.3 Practical Question(s) From BCA304   [25]

Viva-Voce   [25]