PUNJABI UNIVERSITY PATIALA

SYLLABUS,
OUTLINE OF PAPERS AND TESTS

FOR

BACHELOR OF COMPUTER APPLICATIONS (B.C.A.)

PART – II (ANNUAL)

FOR 2019, 2020 & 2021 Examinations

PUNJABI UNIVERSITY PATIALA

SYLLABUS,
OUTLINE OF PAPERS AND TESTS FOR
B.C.A. PART TWO (ANNUAL)

FOR 2019, 2020 & 2021 Examinations

Paper Code	Title of Paper	Hours per Week	University Examination	Internal Assessment	Max. Marks	Time Allowed
BCA-201	General English (Communication Skills – II)	4	80	20	100	3 Hrs.
BCA-202	Punjabi (Compulsory) or Punjabi Compulsory (Mudla Gyan)	4	80	20	100	3 Hrs.
BCA-203	Data Structures	4	80	20	100	3 Hrs.
BCA-204	Discrete Mathematics	4	80	20	100	3 Hrs.
BCA-205	Object Oriented Programming using C++	4	80	20	100	3 Hrs.
BCA-206	Computer Network, Internet & its Applications	4	80	20	100	3 Hrs.
BCA-207	Software Lab – III (Programming in C++)	4	50	-	50	3 Hrs.
BCA-208	Software Lab – IV (Data Structures)	4	50	-	50	3 Hrs.
BCA-209*	Environmental and Road Safety Awareness (Qualifying Paper)		100	-	100	3 Hrs.
	Total		**580**	**120**	**700**	

***In case the students have already cleared the course of Environmental and Road Safety Awareness in BCA – Part I, he/she need not take the course BCA-209.**

NOTE:

1. The breakup of marks for the practical will be as under
   - i. Lab Record — 10 Marks
   - ii. Viva Voce — 10 Marks
   - iii. Program Development and Execution — 30 Marks

2. The breakup of marks for internal assessment for theory papers will be as under :
   - i. One or two tests out of which minimum on best will be considered for assessment. — 10 Marks
   - ii Assignments/Quizzes — 5 Marks
   - iii Attendance, Class participation and behaviour — 5 Marks

BCA-201: GENERAL ENGLISH (COMMUNICATION SKILLS – II)

Common Syllabus Supplied by Department of English, Punjabi University, Patiala.

BCA-202 L phHphHJ/H$phH;hHJ/H$phHghHJhH Gkr^d{ik (;kbkBk) gzikph bkiawh ns/ w[ZYbk frnkB

Common Syllabus Supplied by Department of Punjabi, Punjabi University, Patiala.

BCA-203 : DATA STRUCTURES

Maximum Marks: 80 **Maximum Time: 3 Hrs.**
Minimum Pass Marks: 35% **Lectures to be delivered: 90 Hours**

A) Instructions for the Paper setter
The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 20% marks each. Section E will consist of 5-10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20% marks in all.

B) Instructions for the Candidates
Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
Use of non-programmable scientific calculator is allowed.

SECTION-A

Basic concept and notations, data structures and data structure operations, mathematical notation and functions, algorithmic complexity, Big 'O' notation and time space trade off.
Arrays : Linear array, Representation of Linear array in memory, Traversing Linear array, Insertion and deletion in an array, Multi-dimensional array : Row-Major Order, Column Major order, sparse matrix.

SECTION-B

Stacks : Representation of stack in memory (Linked and sequential), Operations on stacks, Applications of Stacks : Conversion from infix notation to post fix notations, Evaluation of Postfix Notation, Matching of Parenthesis, Recursion, Tower of Hanoi.
Queues: Representation of Queues in memory (Linked and sequential), Operations on queqes, Application of Queues
Linked list, representation of linked list using static and dynamic data structures. Insertion and deletion of a node from a Linear linked list, Doubly linked list, Circular linked list. Application of linked lists.

SECTION-C

Trees: Definitions and Basic concepts, Linked Tree Representation and representation in contiguous storage, Binary Trees, Binary Tree Traversal, Searching, Insertion and Deletion in Binary Tree. Binary Search Tree, Heap and Heap Sort Algorithm.
Graphs: Definitions and Basic concepts, Sequential and linked Representation- Adjacency Matrix and Adjacency List. Operations on Graphs: Traversing a Graph using DFS and BFS.

SECTION-D

Searching and sorting : Linear and binary search, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Radix Sort and Quick Sort,Comparison of various searching and sorting algorithms.

Text Book:

1. Tenenbaum, Y. Lanhghsam and A. J. Augenstein, "Data Structures Using C and C++", Prentice Hall of India.

Reference Books:

1. Seymour Lipschutz "Theory & Practice of Data Structures", McGraw Hill.
2. Thomas Naps and Bhagat Singh", Introduction to Data Structures with Pascal", West Publishing.
3. E. Horowitz and S. Sahni, "Data Structures with Pascal", Galgotia, 3rd Edition, 1991.
4. Ah. A.V. Hopcraft J.E. and Ullman, J.D. "The Design and Analysis of Computer Algorithms", Addison Wesley.

BCA-204: DISCRETE MATHEMATICS

Maximum Marks: 80 **Maximum Time: 3 Hrs.**
Minimum Pass Marks: 35% **Lectures to be delivered:90 Hours**

A) Instructions for the Paper setter
The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 20% marks each. Section E will consist of 5-10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20% marks in all.

B) Instructions for the Candidates
Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
Use of non-programmable scientific calculator is allowed.

SECTION-A

Set Theory: Sets, Type of sets, Set operations, Principle of Inclusion-Exclusion, Cartesian prodouct of sets, Partitions, Minsets, Maxsets.
Logic : Propositions, Implications, Precedence of logical operators, Translating English sentences into logical expressions, Propositional equivalence, Predicates and Quantifiers, Nested Quantifiers, Order of Quantifiers.
Principle of Mathematical induction.
Counting : The Basics of counting, Pigeonhole principle, Permutations and combinations,..

SECTION –B

Relations: Relations and diagraph, n-ary relations and their applications, properties of relations, representing relations, closure of relation, equivalence relation, operation on relations, partial ordering.
Functions: Functions, One-to-one Functions, Onto Functions, Inverse and Composition of Functions, Floor Function, Ceiling Function.
Growth of functions: Big-O Notation, Big-Omega and Big-Theta Notation.

SECTION-C

Recurrence Relations: Introduction, Order and Degree of Recurrence relation, Solution of linear recurrence relations, Homogeneous solution, particular solution, total solution, Generating functions.
Lattice: Partially ordered sets (POSET), Lattices, Sublattices, Isomorphic lattices, Properties of Lattices, Special types of Lattices, Atom, Duality
Boolean Algebra: Introduction, Boolean Expression and Boolean Functions, Identities of Boolean Algebra, Duality, Disjunctive Normal Form, Conjunctive Normal Form, Design of Circuits.

SECTION-D

Graphs: Introduction to Graph, Graph terminology, Representing graphs and Graph Isomorphism, Connectivity, Euler Paths and Circuits, Hamillonian paths and circuits, Shortest Path Problems, Planar Graphs.
Trees : Trees, labelled trees, Tree Traversal, Undirected trees, Spanning Trees, Minimum spanning trees.

Text Book:

1. Elements of Discrete Mathematics, Tata McGraw Hill.

Reference Books:

1. Discrete Mathematical Structures-Bernard Kolman, Robert C. Busby, Sharon C. Ross, Pearson Education Asia.
2. Discrete Mathematics-Richard Johnsonbaugh, Pearson Education, Asia.
3. Discrete Mathematics, Seymon Lipschutz & Max Lans Lipson, Tata McGraw Hill.

BCA-205: OBJECT ORIENTED PROGRAMMING USING C++

Maximum Marks: 80 **Maximum Time: 3 Hrs.**
Minimum Pass Marks: 35% **Lectures to be delivered: 90 Hours**

A) Instructions for the Paper setter
The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 20% marks each. Section E will consist of 5-10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20% marks in all.

B) Instructions for the Candidates
Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
Use of non-programmable scientific calculator is allowed.

SECTION-A

Evolution of OOP: Procedure Oriented Programming, OOP Paradigm, Advantages and disadvantages of OOP over its predecessor paradigms.
Characteristics of Object Oriented Programming: Abstraction, Encapsulation, Data hiding, Inheritance, Polymorphism, Code Extensibility and Reusability, User defined Data Types.
Introduction to C++: Identifier, Keywords, Constants,
Operators: Arithmetic, relational, logical, conditional and assignment. Sizeof operator, Operator precedence and associativity.
Type conversion, Variable declaration, expressions, statements, manipulators
Input and output statements, stream I/O, Conditional and Iterative statements, breaking control statements.

SECTION-B

Storage Classes: Automatic, Static, Extern, Register.
Arrays, Arrays as Character Strings, Structures, Unions, Bit fields, Enumerations and User defined types.
Pointers: Pointer Operations, Pointer Arithmetic, Pointers and Arrays, Multiple indirections, Pointer to functions. Functions: Prototyping, Definition and Call, Scope Rules. Parameter Passing: by value, by address and by reference, Functions returning references, Const functions, recursion, function overloading, Default Arguments, Const arguments.

SECTION-C

Pre-processor : #define, #error, #include, #if, #else, #endif, #ifdef, #ifindef, #undef
Type casting : static-cast, const-cast, dynamic-cast, reinterpret-cast.
Classes and Objects: Class Declaration and Class Definition, Defining member functions, making functions inline, Nesting of member functions, Members access control. this pointer. Union as space saving classes. Objects: Object as function arguments, array of objects, functions returning objects, Const member functions. Static data members and Static member functions.

SECTION-D

Friend functions and Friend classes. Constructors: properties, types of constructors (Default, parameterized and copy), Dynamic constructors, multiple constructors in classes.
Destructors: Properties, Virtual destructors. Destroying objects. Rules for constructors and destructors.
Array of objects. Dynamic memory allocation using new and delete operators, Nested and container classes
Scopes: Local, Global, Namespace and Class
Inheritance: Defining derived classes, inheriting private members, single inheritance, types of derivation, function redefining, constructors in derived class.

Text Book:

1. Bjarne Strautrup, “The C++ Programming Language”, Addition- Wesley Publication Co.

Reference Books:

1. Herbert Schildt, “The Complete Reference C++”, Tata McGraw-Hill.
2. Deitel and Deitel, “C++ How to Program”, Pearson Education.
3. Robert Lafore, “Object Oriented Programming in C++”, Galgotia Publications.
4. Stanley B. Lippman, Josee Lajoie, “C++ Primer”, Pearson Education.
5. E. Balagurusamy, “ Object Oriented Programming with C++”, Tata McGraw-Hill.

BCA-206: COMPUTER NETWORKS, INTERNET AND ITS APPLICATIONS

Maximum Marks : 80 **Maximum Time: 3 Hrs.**
Min Pass Marks: 35% **Lectures to be delivered: 90 Hours**

A) Instructions for the Paper setter
The question paper will consist of five sections: A, B, C, D and E. Sections A, B, C and D will have two questions from the respective sections of the syllabus and will carry 20% marks each. Section E will consist of 5-10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20% marks in all.

B) Instructions for the Candidates
Candidates are required to attempt one question each from the section A, B, C and D of the question paper and the entire section E.
Use of non-programmable scientific calculator is allowed.

SECTION-A

Computer Networks: Uses of Computer Network, Network Hardware, Network Software, Goals and Applications of Computer networks, Structure of Computer Network: Point-to-point structure, Broadcasting structure. Reference Models: OSI Reference Model; TCP/IP Model, Comparative Overview of Two.

SECTION-B

Data Communication: Transmission media, Wireless communication, and the Telephone system, Introduction to cellular radio and communication satellite, Data Rate of Channel, Electromagnetic spectrum.
Switching : Circuit switching, packet switching, message switching.
Multiplexing : FDM, TDM.

SECTION-C

Introduction to Internetworking – Concepts, Repeaters, Routers, Bridges, and Gateways.
MAC Protocols : Pure and slotted, Aloha, CSMA Protocols.
Internet Protocol: IP protocol, IP Addresses,

SECTION-D

Internet Applications: Domain Name System, Electronic mail, The World Wide Web, Multimedia - Audio, Video, Data compression, File Transfer and Remote File Access: Introduction, data transfer and distributed communication, generalised file transfer, interactive and batch transfer, FTP, FTP model, FTP interface, client-server interaction in FTP.

Text Book:

1. Andrew S. Tanenbaum, “Computer Networks”, PHI Publications.

Reference Books:

1. Stallings William, “Data & Computer Communication”, PHI Publications.
2. D.E. Corner, “Computer Networks and Internets’, Addison-Wesley Publication.
3. D. Bertsellas and R. Gallager, “Data Networks”, Prentice Hall.

BCA-207 SOFTWARE LAB – III (PROGRAMMING LAB IN C++)

Maximum Marks: 50 **Maximum Time: 3 Hrs.**
Minimum Pass Marks: 35% **Lectures to be delivered: 90 Hours**

Assignments based on the Paper BCA-205. Implement programs in C++ for the following:

1. Program flow control (for, while, do while, if, if else, switch).
2. Inbuilt Data Structures (arrays, structures, unions, pointers, enumerations)
3. Functions (inline, parameter passing, overloaded)
4. Classes, Objects and Members (Constructors, Destructors)
5. Inheritance (types of derivation, types of inheritance)
6. Polymorphism (operator overloading, static binding, dynamic binding, pure virtual functions)
7. Files and streams

BCA-208 SOFTWARE LAB – IV (DATA STRUCTURES)

Maximum Marks: 50 **Maximum Time: 3 Hrs.**
Minimum Pass Marks: 35% **Lectures to be delivered: 90 Hours**

NOTE: Data Structures covered under the paper BCA-203 are to be implemented in C++.

BCA 209 : Environmental and Road Safety Awareness

Common Syllabus Supplied by Department of Zoology, Punjabi University, Patiala.