



University of Rajasthan Jaipur

SYLLABUS

Bachelor of Computer Application

B.C.A. Part-I Examination	2022
B.C.A. Part-II Examination	2023
B.C.A. Part-III Examination	2024

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Bachelor of Computer Applications (BCA)

Eligibility for Admission to BCA course session 2014-2015 "A candidate must have passed 10+2 examination (Arts/Science/Commerce) or equivalent with securing 48% or more (minimum pass mark for SC/ST/OBC/SBC candidates) in aggregate without any approximations".

In regard to reservation of Seats for admission to BCA Part I, the reservation policy of Govt. of Rajasthan/University of Rajasthan will be followed.

Admission Procedure: Admission to BCA Part I course will be made on the basis of merit list (10+2 level).

Attendance: A candidate shall be required to put in a minimum of 75% attendance at the lectures and 75% attendance at the practicals separately in each paper, as per university norms.

Scheme of Examination for Bachelor of Computer Applications(BCA):

The Bachelor of Computer Applications will be a Three Part Course in Faculty of Science extending over three academic sessions. Medium of instructions and examination will be English only. There shall be an examination at the end of each part. Each theory paper examination will be of three hour duration and shall carry 100 marks. Theory paper shall contain three parts. All questions are compulsory.

Part - I (very short answer) consists 10 questions of two marks each with two questions from each unit. Maximum limit for each question is up to 40 words.

Part - II (short answer) consists 5 questions of four marks each with one question from each unit. Maximum limit for each question is up to 80 words.

Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

Each practical examination (Maximum marks 100) will be of four hour duration on one day and carry 60 marks for exercises(3 exercises) assigned in the examination, 25 marks for viva-voce and 15 marks for practical records and regularity of the candidate. Other rules and procedures of examinations will be common to those for B.Sc. course.

"A candidate will be promoted to Part III if he/she passed with 40% in three theory and two practical papers of Part II examination and with at least 50% in aggregate of these papers. However, if the candidate has not passed Part I, I examination then also he/she be promoted to part III if the number of due papers (part I & Part II together) does not exceed four theory papers and two practical papers."

Passing of Examination and Promotion to next Part: A candidate must secure at least 40% marks in each paper and 50% marks in aggregate for passing a part examination. A

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candidate will be promoted to part II if he/she has secured at least 40% in three theory and two practical papers of part I examination and with at least 50% in aggregate of these papers. A candidate will be promoted to Part III if he/she has passed 40% in three theory and two practical papers of Part II examination and with at least 50% in aggregate of these papers, and has passed Part I examination.

Division and Honors: On successful passing out of all three part examinations (in first attempt), those securing 75% and above in aggregate of all the three parts will be awarded First division with Honors, and those securing between 60% or more but less than 75% will be awarded First division and rest will be awarded Second division.

BCA Part - I

Code	Subject	Hours / Week	Max. Marks
Theory			
BCA-101	Elementary Physics	4	100
BCA-102	Basic Mathematics	4	100
BCA-103	General English	4	100
BCA-104	Principles of Programming Language (Through 'C')	4	100
BCA-105	Computer Organization	4	100
BCA-106	Office Management Tools	4	100
Practical			
BCA-107	Technical Writing and Communication Skills	3	100
BCA-108	C- Laboratory	3	100
BCA-109	Office Automation Laboratory	3	100
BCA-110	Typing Skills Laboratory (English and Hindi Language)	3	100

BCA Part - II

Code	Subject	Hours / Week	Max. Marks
Theory			
BCA-201	Business Accounting	4	100
BCA-202	Discrete Mathematics	4	100
BCA-203	Operating System	4	100
BCA-204	Database Management System	4	100
BCA-205	Web Designing and Multimedia	4	100
	Elective (Any One)		
BCA-206(A)	Object Oriented Programming Concepts (Through C++)	4	100
BCA-206(B)	Programming through VBA/MS	4	100
Practical			

BCA-207	Database Laboratory	3	100
BCA-208	Object Oriented Laboratory	3	100
BCA-209	Web Designing Laboratory	3	100
BCA-210	Multimedia Laboratory	3	100

BCA Part - III

Code	Subject	Hours/ Week	Max. Marks
Theory			
BCA-301	Data Structure (Using C/C++)	4	100
BCA-302	System Design Concepts	4	100
BCA-303	Networking Technologies	4	100
BCA-304	Core Java Programming	4	100
BCA-305	E-Commerce	4	100
	Elective (Any One)		
BCA-306(A)	ASP.Net	4	100
BCA-306(B)	PHP	4	100
BCA-306(C)	Linux and Shell Programming	4	100
Practical			
BCA-307	Networking Laboratory	3	100
BCA-308	Core Java Laboratory	3	100
BCA-309	Elective Laboratory	3	100
BCA-310	Project	3	100

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BCA Part - II

BCA201: Business Accounting

Question Paper pattern for Main University Examination

Max Marks: 100

Part - I (very short answer) consists 10 questions of two marks each with two questions from each unit. Maximum limit for each question is up to 40 words.

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Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

UNIT I

Basics of Bookkeeping and Accounting : Financial Accounting – Definition, Scope and Objective of Financial Accounting. Users of accounting information, Limitations of Financial Accounting. Financial Accounting Principles, Concepts and Conventions.

UNIT II

System of Bookkeeping : Accounting Process, Double Entry System, Books of Prime Entry, Subsidiary Books, Recording of Cash and Bank Transactions.

UNIT III

Ledger Accounts – Preparation of Ledger Accounts, Bank Reconciliation Statements, Preparation of Trial Balance.

Depreciation Accounting – Meaning, need and importance of depreciation, Straight Line and Diminishing Balance method, Computation and Accounting Statement of Depreciation, change in Depreciation method. Provisions & Reserves, Rectification of Errors.

UNIT IV

Final Accounts : Opening and Closing Entries, Trading, Profit and Loss accounts and Balance Sheet.

UNIT V

Final Accounts with Adjustments : Adjustments of Dividends, Drawings, Outstanding incomes and expenses, Depreciation. Tax liabilities. Insurance Claims for loss of Stock and loss of Profit.

Recommended reference books :

1. Shukla & Grewal : Advanced Accounts.
2. Sharma, Shah, Agrawal : Financial Accounting.
3. Rajesh Agrawal & R. Srinivasan : Accounting Made Easy (Tata McGraw-Hill)

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BCA202 : Discrete Mathematics

Question Paper pattern for Main University Examination

Max Marks: 100

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Part - II (short answer) consists 5 questions of four marks each with one question from each unit. Maximum limit for each question is up to 80 words.

Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

UNIT - I

Number Systems: Number systems- natural numbers, integers, rational numbers, real numbers, complex numbers, arithmetic modulo a positive integer. Radix r representation (decimal and binary), Change of radix(decimal to binary and vice versa).

Binomial Theorem and Mathematical Induction : Binomial theorem for positive integral indices, general and middle term in binomial expansion with simple applications. Some simple problems of Principle of Mathematical induction.

Recurrence Relations and Generating Functions : Recurrence relation, linear recurrence relation with constant coefficients, solution of linear recurrence relation with constant coefficients. Generating functions, Solution of recurrence relations using generating functions.

UNIT - II

Sets : Definition of sets, representation of sets, type of sets, Operations on sets, Sub sets, Power set, Universal set, Complement of a set, Union and Intersection of two sets, Venn diagrams, De-Morgans law of sets, Partition of sets, Duality Principles.

Relations: Relation, Types of relations- reflexive, symmetric, anti-symmetric, transitive, equivalence and partial order relation. Relation and diagraphs, Cartesian product of two sets.

Functions: Function, domain and range, One to one and onto functions, composite functions, inverse of a functions. Binary operations.

UNIT - III

Logic and Proofs : Proposition, Conjunction, Disjunction, Negation, Compound proposition, Conditional propositions (Hypothesis, conclusion, necessary and sufficient condition) and Logical equivalence, De Morgan's law, Tautology and contradiction, quantifiers, universally quantified statements, component of a Mathematical system (axiom, definitions, undefined terms, theorem, lemma and corollary), proofs (direct proofs, indirect proofs, proof by contra-positive), Mathematical Induction.

Boolean Algebra : Definition and Laws of Boolean Algebra, Boolean functions, Simplification of Boolean functions, Special forms of Boolean functions, Application of Boolean algebra(open and closed switches, switches in series and parallel). Logic gates and Circuits.

UNIT - IV

Graph : Basic terminology, directed and undirected graphs, path and connectivity, types of graphs- Null, Regular, Complementary, Complete, Weighted and Bipartite. Subgraphs, Operation on graphs- union, intersection, complement, product and composition. Representation of graphs in computer memory(matrix representation)- Adjacency matrix, Incidence matrix. Fusion of graphs. Isomorphic and Homeomorphic graphs, paths and cycles, Eulerian and Hamiltonian graphs, shortest path algorithm. Planar graphs, graph coloring. Shortest path algorithms. Travelling salesman problem

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UNIT - V

Tree : Definition of tree, Fundamental terminologies-Node, Child, Parent, Root, Leaf, Level, Height and Subling. Rooted trees, Ordered trees, Binary tree, Complete binary tree, Tree of an algebraic expression, Tree searching (traversal algorithms)- Preorder, Inorder and Postorder. Distance and centre, Relation between general tree and binary tree, Spanning trees, Algorithms for minimal spanning trees (Kruskal's and Prim's). Game tree.

Recommended reference books :

1. C.I.Liu ; elements of Discrete Mathematics Tata McGraw Hill publishing Company Ltd., 2000
2. Richard Johnsonbaugh discrete mathematics pearson Asia 2001 .
3. John Truss : Discrete Mathematics for Computer Scientists, Pearson Education, Asia, 2001.
4. Robert J.McEliece : Introduction to Discrete Mathematics, Tata Mc. Graw Hill, India.
5. Lipschutz : Discrete Mathematics, Tata Mc. Graw Hill India.
6. Kenneth H. Rosen, Discrete mathematics and Applications, Tata Mc. Graw Hill, India.

BCA203 : Operating System

Question Paper pattern for Main University Examination

Max Marks: 100

Part - I (very short answer) consists 10 questions of two marks each with two questions from each unit. Maximum limit for each question is up to 40 words.

Part - II (short answer) consists 5 questions of four marks each with one question from each unit. Maximum limit for each question is up to 80 words.

Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

UNIT - I

Necessity of Operating system. Operating system terminology, Evolution of Operating Systems (multiprogramming systems, batch systems, timesharing system, Process control and Real-time system). Factors in OS Design (performance protection and security, correctness, maintainability application integration, portability, and interoperability).

Device Management: General device characteristics, I/O Programming concepts, device controllers, device drivers Interrupts Driven I/O Memory Mapped I/O, Direct Memory Access Buffering, Device Management Scenarios (serial communications, sequentially accessed storage devices, randomly accessed devices).

UNIT - II

Process Management: Process definition, Process control, initializing Operating System, Process Address Spaces Process Abstraction, resource Abstraction and Process Hierarchy. Scheduling Mechanisms, Partitioning a process into small processes Non-preemptive strategies (first come-first served, shortest job next, priority scheduling deadline scheduling), Preemptive strategies (Round Robin, two queues, multiple level queues). Basic Synchronization principles . Interactive processes coordinating processes, Semaphores, Shared memory multiprocessors, AND Synchronization, Inter process communication, inter process messages, mailboxes.

Deadlocks, Resource Status Modeling Handling deadlocks, deadlock detection and resolution deadlock avoidance.

UNIT - III

Memory Management: Requirements on the primary memory, mapping the address space to primary memory, dynamic memory for data structures, Memory allocation (Fixed partition Memory allocation strategy), Dynamic Address Relocation, Memory Manger Strategies (Swapping, Virtual Memory, Shared Memory Multiprocessors). Virtual Memory : Address translation paging, Static and dynamic paging algorithms.

UNIT - IV

Information Management: Files (Low level files, structured files, database management systems, multimedia storage). Low level file implementation. Storage Abstraction (Structure sequential files, indexed sequential files, database Management Systems, Multimedia documents). Memory mapped files, Directories, directory implementation, file sharing information across-network remote Viruses and Worms, Security Design principles, Authentications, Protection mechanisms, encryption, Protection of User Files.

UNIT - V

Distributed Computing: Distributed process management, message passing, remote procedure call, distributed memory management, security in distributed environment., Introduction of Parallel Processing.
Protection an Security goals, Domain of Protections, Security Problems, Authentication, System threats, Encryptions,
Introduction of different Operating systems (Linux, Unix, Windows Server)

Recommended reference books:

1. Galvin P.B, Silberschatz; Operating System Principles; (Seventh Edition), Wiley 2008
2. Tanenbaum A.S, Modern Operating Systems, 2nd Edn. PHI Publ, 2003
3. William Stalling: Operating Systems, Internal & Design Principles, Sixth Edn; Pearson, 2009.
4. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition) , Pearson Education, 2008.
5. D.M. Dhandhere: Systems Programming and Operating Systems (Second Edition), Tata McGraw Hill Publishing company Limited.
6. Harvey M. Deitel, Operating Systems, Pearson Education.

BCA204 : Data base Management System

Question Paper pattern for Main University Examination

Max Marks: 100

Part - I (very short answer) consists 10 questions of two marks each with two questions from each unit. Maximum limit for each question is up to 40 words.

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Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

UNIT - I

Database System Concepts & Architecture: Overview of DBMS, Basic DBMS terminology, data base system v/s file system, Advantages and dis advantages of DBMS, Codd rules, data independence Architecture of a DBMS, Schemas, Instances, Database Languages, Database Administrator, Data Model.



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UNIT- II

Data Modeling: Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation.

Relational Algebra: Fundamental operations of relational algebra & their implementation, interdependence of operations.

UNIT-III

Database Design: Functional dependencies, loss less decomposition, 1st, 2nd & 3rd normal forms, dependency preservation, boyce codd NF. Introduction to Transactions, transaction states.

Security : Access control, Backup, recovery, maintenance and performance.

UNIT- IV

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.

UNIT- V

Introduction to Advance DBMS:

Object-based Databases : Object-Oriented Databases: Object-oriented data model, Object Oriented Languages, Persistent Programming Languages. Object-Relational Databases: Nested Relations, Storage for Object Databases

Distributed Databases : Distributed Data Storage, Distributed Transactions, Commit protocol, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing

Reference Books:

1. Korth H F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill,2006
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4th Edn: HPB,2009
4. Navathe S.B. Elmasri R.; Fundamentals of Database Systems, Fifth Edition, Pearson 2009.
5. Ramakrishan and Gharke, Database Management Systems, 3rd Edition, Tata Mc Graw Hill, 2003.
6. Data C J Database Management Systems, Pearson Education Asia.
7. Singh S.K.; Database Systems; I Edition; Pearson, 2006.

BCA205 : Web Designing and Multimedia

Question Paper pattern for Main University Examination

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Part - I (very short answer) consists 10 questions of two marks each with two questions from each unit. Maximum limit for each question is up to 40 words.

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Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

UNIT - I

World Wide Web : Elements of the Web, Web browser and its types, viewing pages with a browser, using a browser for Mail, News and chat, Security and Privacy issues (cookies, firewalls, executable Applets and scripts, blocking system), Plug-Ins and Active controls, dealing with Web pages that contain Active X, playing streaming Audio and Video, playing MP music. Using Search engines, subscriptions and channels, making use of web resources (Portal, News and weather, sports Personal Financing and Investing, Entertainment, shopping, Computers and Internet, Travel, Health and Medicine, Communities and Clubs).

UNIT - II

HTML Fundamentals: Introduction to HTML, Creating HTML Pages, incorporating Horizontal Rules and Graphical Elements, Hyper-links, Creating HTML Tables, Creating HTML Forms, HTML and Image Techniques, HTML and Page, Frames, Development of Website and Webpage (Planning, Navigation and Themes, Elements of a Web page, steps of creating a site, publishing and publicizing site structuring web site.

UNIT-III

Introduction to DHTML: features of DHTML, CSS: Types of Style sheets, Different elements of Style sheets, Filter effects, IFrame, DIV and Layer Tags.

UNIT-IV

Java Script Fundamental: Introduction to Java Script Working with Variables and Data Functions, Methods and Events, Controlling Programming Flow. The Java Script Object Model Java Script language Objects, Developing Interactive Forms, Cookies and Java Script Security Controlling Frames in Java Script, Client - Side Java Script Custom, JavaScript Objects. Introduction to JQuery and AJAX.

UNIT - V

Introduction of Photoshop

Creating a New File:- Main Selections, Picking color, Filling a selection with color, More ways to choose colors and fill selections, Painting with paintbrush tool, Using the magic wand tool and applying a filter, Saving your document (save your file:- Save file as a JPEG, TIFF, GIF, PNG), Introduction and use of layers, Introduction and use of tool of PhotoShop.

Introduction to Coral draw-

Introduction to coral draw, use and importance in designing, various graphic file and file extension, vector image and raster images, introduction to screen and work area.

Introduction and use of tool of coral draw.

References :

1. Mastering HTML 5.0 by Deborah S.Ray an Eric J. Ray From BPB
2. Mastering Java Script, BPB publication.
3. Black book Photoshop,
4. Blackbook CoralDraw.
5. M.L. Young: Complete Reference to Internet, 3rd Edition, Tata McGraw Hill, 2006
6. Thomas A. Powell: Web Design - C.R. - Second Edition FINE, 2009
7. Thomas A. Powell: HTML & XHTML - C.R. Fourth Edition: FINE, 2005
8. G. Robertson, Handbook HTML - BPB Publications
9. Joel Olla: Principles of Web Design BPB Publications

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BCA206 (A) : Object Oriented Concepts (Through 'C++')

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Part - II (short answer) consists 5 questions of four marks each with one question from each unit. Maximum limit for each question is up to 80 words.

Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

UNIT - I

Introduction to Object Oriented Concepts: Evolution of OOP, OOP Paradigm, advantages of OOP, comparison between functional programming and OOP approach, characteristics of object oriented language - objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading.

UNIT - II

Introduction to C++: C++ tokens, data types, C++ operators, type conversion, variable declaration, arrays, statements, expressions, conditional statements, Jumping statements, loops, functions, pointers, structures.

UNIT - III

Classes and Objects: Classes, objects, defining member functions, arrays of class objects, pointers and classes, passing objects, constructors, types of constructors, destructors, this pointer, access specifiers, friend functions, inline functions.

UNIT - IV

Inheritance: Introduction, Importance of Inheritance, types of inheritance, Constructor and Destructor in derived classes.

Polymorphism: Function overloading, operator overloading, virtual functions, pure virtual functions

UNIT - V

File Management: Handling Data files (sequential and random), Opening and closing of files, stream state member functions, Operations on Files. Templates, Exception Handling.

Reference Books

1. Herbert Schildt; C++ : The Complete Reference 4th Edn; TMH, 2003.
2. Robert Lafore; Object Oriented Programming in C++ 4th Edition; Techmedia.
3. Balagurusamy ; Object Oriented Programming in C++; 4th Edition TMH,2009.
4. Venugopal, Rajkumar; Mastering C++; Tata Mcgrow Hill, 2006.
5. Kanetkar Y.: LET US C++; BPB; 2009.
6. Deitel and deitel; How to program C++, Addison Wesley, Pearson Education Aisa
7. John R. Hubbard, Programming with C++, McGraw Hill International

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BCA206 (B) : Programming through VB 6.0

Question Paper pattern for Main University Examination

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Part - II (short answer) consists 5 questions of four marks each with one question from each unit. Maximum limit for each question is up to 80 words.

Part - III (Long answer) consists 5 questions of twelve marks each with one question from each unit with internal choice.

UNIT - I

Introduction - Introduction Graphical User Interface (GUI), Programming Language (Procedural, Object Oriented, Event Driven), The Visual Basic Environment, Editions of Visual Basic, Features of VB, How to use VB compiler, debug and run the programs, Introduction to tool box, object naming conventions, setting properties, Methods and Events, Working with basic objects - forms, labels, textboxes, command buttons, option button, check box, Frame and Image.

UNIT - II

Programming Fundamentals - Data types in VB, Variables and Declaration, Scope of variables, Operators in VB, sub procedures and functions, Control structures - IF, Select ..case, Do while ...loop, Do ... loop while, Do ... loop until, For ..Next, Exit For, Exit Do, With .. End With. Fixed size and Dynamic Arrays, control array, Data type conversion functions, VB Built in functions - Date, time, Format and String.

UNIT - III

Additional Controls and Menus - List box and combo box controls, Scroll bars, Picture box control, Shape and line controls, Timer control, Menu basics, Menu Editor, Creating menus, Assigning access keys and short cuts, Separating menu items, creating popup menus, controlling menus at run time.

UNIT - IV

Dialog Boxes, Mouse Events, MDI Forms and Error Handling - Standard, Custom and Common Dialog Control and Mouse Events, Creating and using MDI Form, Arranging the child forms, Adjusting the size of controls, Runtime errors, Handling runtime errors by on error .. Statements, Err object, Debug and immediate window.

UNIT - V

Database Connectivity and Crystal Reports - Connecting with databases through ADO DC control, Bounded and unbounded methods for displaying data, Accessing and Navigating database, Recordset - Tabletype, Dynaset, snapshot, dynamic and forward only, connecting database using connection string, Introduction to crystal reports, sections of report, creation of report using database, linking report with vb programs.

Reference Books

1. Petroustos Evangelos: Mastering Visual Basic 6.0; BPB Publications, 2002.
2. Norton's Peter: Guide to Visual Basic 6.0. Techmedia.
3. Kurata Deborah: Doing Objects in Visual Basic. Techmedia.

1. Mastering database programming with Visual Basic 6.0 by Petroustos.

BCA-207: Database Laboratory

Practical Lab Exercises based on Theory Paper BCA- 204

BCA-208: Web Designing Laboratory

Practical Lab Exercises based on Theory Paper BCA -205

BCA-209: Multimedia Laboratory

Practical Lab Exercises based on Theory Paper BCA- 205

Elective (any One)

BCA-210(A): Object Oriented Laboratory

Practical Lab Exercises based on Theory Paper BCA -206(A)

BCA-210(B): Programming through VB 6.0 Laboratory

Practical Lab Exercises based on Theory Paper BCA- 206(B)

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