University of Rajasthan

Jaipur

<u>SYLLABUS</u>

B.C.A Part-II Examination 2024

Bechelor of Computer Applications (BCA)

Eligibility of Admission of BCA course Session 2022-23 "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 practical separately in each paper, as per university norms.

Scheme of Examination for Bachelor of Computer Application (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 three hours 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.

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

A 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 pass 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 Examination then also he/she be promoted to part III if the number of due paper (Part I & Part II together) does not exceed **four theory papers** and **two practical papers**.

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 60% or more but less than 75% will be awarded **First division** and rest will be awarded **Second division**.

Course Structure: Each Part of BCA course consists of 6 theory papers and 4 practical papers. Four theory and three practical papers and core courses and two theory and one practical as elective courses.

BCA Part-II 2023-24 Onwards

Code	Subject	Course	Hours/Week	Max. Marks
	Theory			
BCA-201	Object Oriented Programming Through C++	CCC	4	100
BCA-202	Database Management Systems	CCC	4	100
BCA-203	Software Engineering	CCC	4	100
BCA-204	Data Structure and Algorithms	CCC	4	100
BCA-205	Cloud Computing	CCC	4	100
	Elective-I	ECC	4	100
	Practical			
BCA-207	OOP Lab	CCC	3	100
BCA-208	DBMS Lab	CCC	3	100
BCA-209	Data Structure Lab (using C/C++)	CCC	3	100
	Elective-II Lab	ECC	3	100
	Elective Group-I (Any One)			
BCA- A01	.Net Programming with C#	ECC	4	100
BCA- A02	PHP Programming	ECC	4	100
BCA- A03	Data Science	ECC	4	100
	Elective Group-II (Any One)			
BCA- B01	.Net Lab	ECC	3	100
BCA- B02	PHP Lab	ECC	3	100
BCA- B03	Data Science Lab	ECC	3	100

BCA-201: Object Oriented Programming
Through C++

Question Paper pattern for Ma in University Examination

Max Marks: 100

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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

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, looping statements. loops, functions, pointers, structures.

UNIT — III

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

BCA -202: Data base Management Systems

Question Paper pattern for Ma in 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 Coded rules, data independence, Architecture of a DBMS, Schemas, Instances, Database Languages, Database Administrator, Data Models.

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 Model: Concepts, Constraints, Languages, Relational database design by ER & EER mapping, Relational algebra relational calculus, Relational Algebra, Fundamental operations of Relational Algebra.

UNIT -III

Database Design: Functional dependencies, loss less decomposition, Normalization: 1-NF, 2-NF, 3-NF and BCNF.

Transaction Management: Transactions: Concepts, ACID Properties, States Of Transaction, Serializaibility, Isolation, Checkpoints, Deadlock Handling.

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

Recovery System & Security: Failure Classifications, Recovery & Atomicity, Log Base Recovery, Recovery with Concurrent Transactions, Shadow Paging, Failure with Loss of Non-Volatile Storage, Introduction to Security & Authorization.

BCA-203: Software Engineering

Question Paper pattern for Ma in 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

Software Engineering Fundamentals: Software, Problem Domain, Software Engineering Challenges, Software Processes (processes, projects & products, component).

Software Development Process Models: Waterfall Model, Prototyping. Iterative Enhancement Model, Spiral Model. Introduction to Agile Model: Principles, Steps,Various Agile Process Models.

Software Requirement Analysis & Specification: Need, Characteristics & Components. Introduction to Requirements Modeling: Data Flow Diagram and Use Cases.

UNIT — II

Introduction to Metrics: Function Point, Line of Code (LOC) and KLOC.

Software Project Planning: Cost Estimation- Uncertainties in Cost Estimation, Building Cost Estimation Models, On Size Estimation, COCOMO Model.

Project Scheduling: Average Duration Estimation, Project Scheduling & Milestones.

Quality Assurance Plans: Verification & Validation, Inspection & Reviews.

UNIT — III

Design Engineering: Design Process & Design Quality, Design Concepts (abstraction. architecture, patterns, modularity, information hiding, functional independence. refinement, refactoring, and design classes), The Design Model (data design elements. architectural design elements, interface deslgn elements, component- level design elements, deployment-level design elements).

Unit — IV

Testing Strategies & Tactics: A strategic approach to software testing, Strategic issues. Software testing fundamentals, Test characteristics, Test Strategies for conventional software: Unit Testing, Integration testing, Validation Testing, System testing, Black-Box testing, White Box testing.

Unit — V

Risk Management: Overview, Assessment, Control.

Software Reliability: Measures of Reliability & Availability, Software Safety.

Maintenance and Reengineering: Introduction to: Software Maintenance. Software Supportability, Reengineering, Reverse Engineering, Restructuring, and Forward Engineering.

BCA 204: Data Structures and Algorithms

Question Paper pattern for Main University Examination

Max Marks: 100

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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

Introduction to Algorithm Design: Algorithm, its characteristics, efficiency of algorithms, analyzing Algorithms and problems.

Linear Structure: Arrays, records, stack, operation on stack, implementation of stack as an array, queue, types of queues, operations on queue, implementation of queue.

UNIT — II

Linked Structure: List representation, Polish notations, operations on linked list - get node and free node operation, implementing the list operation, inserting into an ordered linked list, deleting, circular linked list, doubly linked list.

UNIT — III

Tree Structure: Concept and terminology, Types of trees, Binary search tree, inserting, deleting and searching into binary search tree, implementing the insert, search and delete algorithms, tree traversals , Huffman's algorithm.

UNIT — IV

Graph Structure: Graph representation - Adjacency matrix, adjacency list, Warshall's algorithm, adjacency multilist representation. Orthogonal representation of graph . Graph traversals - BFS and DFS. Shortest path, all pairs of shortest paths, transitive closure.

UNIT — V

Searching and sorting : Searching - sequential searching, binary searching. hashing. **Sorting -** selection sort, bubble sort, quick sort, heap sort, merge sort, and insertion sort. efficiency considerations.

BCA-205: Cloud Computing

Question Paper pattern for Ma in University Examination

Max Marks: 100

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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

Introduction of Cloud Computing: Definition. Historical Developments, Enabling Technology, Vision, Essential Characteristics of Cloud Computing, Components of Cloud Computing. Challenges and Approaches of Migration into Cloud, **Cloud Applications:** Applications — Health care, CRM and ERP, Social Networking, Media Applications and Multiplayer Online Gaming, Banefits For the Market. Enterprise. End user and Individuals.

UNIT — II

Cloud Computing Architecture : Introduction, Cloud Reference Model. Architecture. Infrastructure / Hardware as a Service, Platform as a Service, Software as a Services. Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds. Economics of the Cloud, Open Challenges, Cloud Interoperability and Standards. Scalability and Fault Tolerance. Parallel and distributed Computing-Map Reduce. Hadoop, High level Language for Cloud, Service Oriented Computing.

UNIT — III

Virtualization: Introduction, Characteristics of Virtualized Environment. Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Virtualization of CPU. Memory, I/O Devices, Server , Desktop, Network, and data-center. Pros and Cons of Virtualization, Technology Examples- VMware and Microsoft Hyper-V, KVM. Xen.

Unit — IV

Introduction of Cloud security services, Design Principles. Policy lmplementation. Cloud Computing Security Challenges, Cloud Computing Security Architecture. Cloud Security Tools and technologies to secure the data in Private and Public Cloud Architecture. Security Concerns, Legal issues and Aspects, Multi-tenancy issues. **Risk area of Cloud computing, Data Security in Cloud:**   Risk Mitigation, Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management.

Unit — V

Cloud Platforms in Industry: Amazon Web Services- Compute Services, Storage Services, Communication Services and Additional Services. Google AppEngine- Architecture and Core Concepts, Application Life-Cycle, cost model. Microsoft Azure- Azure Core Concepts, SQL **Azure**. Integration of Private and Public Clouds Cloud applications: Protein structure prediction, Data Analysis, Satellite image Processing. CRM and ERP, Social networking.

Elective Theory papers for Elective Group-I of BCA Part-II

BCA-A01: .Net Programming with C#

Question Paper pattern for Main University Examination

Max Marks: 100

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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

Introduction to .Net framework: Managed Code and the CLR intermediate Language. Metadata and JIT compilation Automatic Memory Management.

The Framework Class Library: Net objects – ASP .NET, NET web services, Windows Forms.

Elements: Variable and constants data types, declaration, operators, types precedence. Expressions Program flow, Decision statements, if then if. Then else, select case, loop statements while and while, do. Loop, for next for each.. next

UNIT — II

Types: Value data structures, Enumerations, Reference data types, arrays.

Windows Programming: Creating windows forms windows controls, button, check box, Combo box, Label, List box Radio Button, Text box, Events, Click, close deactivate, Load, mousemove, mousedown, mouseup.

Menus and Dialog Boxes: Creating menus, menu items, context menu, Using dialog boxes, show dialog() method.

UNIT — III

ADO.NET: Architecture of ADO.NET, ADO. NET providers, Connection, Command, Data Adapter, Dataset, Connecting to data source, Accessing data with data set and data reader, create an ADO.NET application, Using Stored Procedures.

Unit — IV

ASP.NET Features: Application of states and Structure; change the home directory in IIS- Add a virtual directory in IIS- Set a default document for IIS- change log file properties for IIS- Stop, start, or Pause a web site.

Unit — V

Creating Web Controls: Web controls, HTML controls, using internist control, using input validation controls, selecting controls for applications, data controls and adding web controls to a page.

Creating Web Forms: Server Controls, Types of Server controls, Adding ASP.NET code to a page.

Web Services and WCF: Web Services protocol and standards- WSDL Documents- Visual Studio .NET Architecture of WCF, WCF Client.

BCA-A02: PHP Programming

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

Introduction to PHP: Installation of PHP and MySQL, PHP configuration in IlS & Apache Web Server, Features of PHP, Writing PHP, Parsing PHP code, Embedding PHP and HTML Executing PHP and viewing in Browser.

UNIT — II

Control Structures: Data types, Operators, PHP variables: static and global variable, Comments in PHP, Control Structures, Condition statements, lf. . . Else, Switch. ? opetator. Loops, While, Break Statement Continue, Do.. .While, For, For each, Exit, Die. Return. Arrays: Numeric, Associative and Multidimensional Arrays

UNIT — III

Strings: Creating and accessing String, Searching & Replacing Strlng, Formatting String, String Related Library function, Pattern matching, Replacing text, Splitting a string with Regular Expression

Functions: Defining a Function, Calling a Function, Parameter passing, Returning value from function

Unit — IV

Form Data Handling: $ GET, $ POST, $ REQUEST Variables, Cookies handling, Session Management

Exception Handling: Understanding Exception and error, Try, catch, throw

Unit — V

File Handling: Opening and closing a file, Copying. renaming and deleting a file.

Database Handling: Connection with MySql Database or ODBC, Performing basic database, operation (Insert, Delete, Update, Select, Truncate Alias, Order By), Setting query parameter.

BCA-A03: Data Science

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

Introduction to Data Science: Concept of Data Science, Need for Data Science. Components of Data Science, Big data, Facets of data : Structured data, Unstructured data, Machine-generated data, Graph-based or network data, audio, image and video streaming data, the need for business Analytics, data science life cycle, applications of data science.

UNIT — II

Data Science Process: Overview of data science process, setting the research goal, retrieving data, clearing, integrating and transforming data, Exploratory data analysis, Data Modeling, Presentation and automation.

UNIT — III

Data Analytics: Types of Analytics, Data analytics lifecycle: Overview- discovery-data preparation-Model Planning-Model Building, Regression analysis,

Classification technique, Clustering, and Association rules analysis.

Unit — IV

Statistics : Basic terminologies, Populations, Sample, Parameter, Estimate, Estimator Sampling Distribution, Standard Error, Properties of Good Estimator, Measures of Centers, Measures of Spread, Probability, Normal Distribution, Binary Distribution, Hypothesis Testing, Chi-Square Test.

Unit — V

Data Science Tools and Algorithms: Basic Data Science languages- R, Python, knowledge of Excel, SQL Database, Introduction to weka, Regression Algorithms- Linear Regression, Logistic Regression, K-Nearest Neighbors Algorithm, K-means algorithm.