

# **SCHEME OF EXAMINATION AND SYLLABUS**

## **FACULTY OF COMPUTER Bachelor in Computer Application (BCA)**

**B.C.A. PART – I EXAMINATION - 2021**

**B.C.A. PART – II EXAMINATION - 2022**

**B.C.A. PART – III EXAMINATION - 2023**



**@M.G.S. UNIVERSITY, BIKANER**

Bachelor in Computer Application  
**SCHEME OF EXAMINATION**

The Number of paper and the maximum marks for each paper together with the minimum marks required for a pass are shown against each subject separately. It will be necessary for a candidate to pass in the theory part as well as practical part of a subject/ paper, separately. Award of Division to Successful candidates at the end of final year examination as per university norms

**Admission rule to the course will be as par Government / University policy declared from time to time.**

**Teaching and Examination scheme for  
Bachelor in Computer Application  
Session 2020-21 Examination 2021  
Part-I**

Paper Code	Paper Name	Lect/ week	Tuto/ week	Exam Hours	Max Marks	Min. Pass Marks
<b>Compulsory Papers</b>						
Paper 1	General English			3	100	
Paper 2	General Hindi `			3	100	
Paper 3	Environmental studies			2	100	
Paper 4	Elementary Computer Application Theory			2	100	
<b>Theory Papers</b>						
BCA-101	Mathematics for Computer Science	3	1	3	70	25
BCA-102	Database Management	3	1	3	70	25
BCA-103	Programming in C++	3	1	3	70	25
BCA-104	Computer Networks	3	1	3	70	25
BCA-105	Computer Fundamentals	3	1	3	70	25
BCA-106	Fundamentals of Computer Programming	3	1	3	70	25
<b>Total of Theory Papers</b>					<b>420</b>	
<b>Papers Paper</b>						
BCA-107	SQL Lab & Mini Project	3		3	60	22
BCA-108	C++ Lab & Mini Project	3		3	60	22
BCA-109	Computer Fundamentals Lab & Mini Project	3		3	60	22
<b>Total of Practical Papers</b>					<b>180</b>	
<b>Grand Total(Theory + Practical)</b>					<b>600</b>	

**Teaching and Examination scheme for  
Bachelor in Computer Application  
Session 2021-22 Examination 2022  
Part-II**

Paper Code	Paper Name	Lec/ week	Tuto/ week	Exam Hours	Max Marks	Min. Pass. Marks
<b>Theory Papers</b>						
BCA-201	Computer Organization	3	1	3	70	25
BCA-202	Operating System	3	1	3	70	25
BCA-203	Java	3	1	3	70	25
BCA-204	Internet Programming	3	1	3	70	25
BCA-205(A)	Cloud Computing	3	1	3	70	25
BCA-205(B)	Data Mining	3	1	3	70	25
BCA-206(A)	Python	3	1	3	70	25
BCA-206(B)	C#	3	1	3	70	25
<b>Total of Theory Papers</b>					<b>420</b>	
<b>Practical Papers</b>						
BCA-207	Java Lab & Mini Project	3		3	60	22
BCA-208	Internet Programming Lab & Mini Project	3		3	60	22
BCA-209	Python/C# Lab & Mini Project	3		3	60	22
<b>Total of Practical Papers</b>					<b>180</b>	
<b>Grand Total(Theory + Practical)</b>					<b>600</b>	

**Bachelor in Computer Application**  
**Session 2022-23 Examination 2023**  
**Part-III**

Paper Code	Paper Name	Lec/ week	Tuto/ week	Exam Hours	Max Marks	Min. Pass Marks
<b>Theory Papers</b>						
BCA-301	Software Engineering	3	1	3	70	25
BCA-302	Data Structure	3	1	3	70	25
BCA-303	PHP	3	1	3	70	25
BCA-304(A)	Search Engine Optimization	3	1	3	70	25
BCA-304(B)	Android Programming	3	1	3	70	25
BCA-305(A)	Cyber Security	3	1	3	70	25
BCA-305(B)	Internet of Things	3	1	3	70	25
BCA-306	Project	3	1	3	70	25
<b>Total of Theory</b>					<b>420</b>	
<b>Paper Name(Practical)</b>						
BCA-307	Data Structure Lab	3		3	60	22
BCA-308	PHP Lab	3		3	60	22
BCA-309	Android/ SEO Lab	3		3	60	22
<b>Total of Practical</b>					<b>180</b>	
<b>Grand Total(Theory+ Practical)</b>					<b>600</b>	

**Note:**

1. At least 3 hrs theory and 3 hrs practical slot should be assigned per week for each paper.

**Instructions for Paper setters**

2. The question paper contains 3 sections. **Section-A** consists of 10 questions (2 questions from each unit of syllabus). **Section-B** consists of 10 questions (2 questions from each unit of syllabus). **Section-C** consists of 5 questions (1 question from each unit of syllabus). The word limit of part A, B and C are 50, 200 and 500 respectively
3. Each practical exam is to be conducted by two examiners one External and one Internal. External examiner should be senior lecturer from jurisdiction of MGS University. External Examiner will prepare question paper of Practical Examination. Students have to perform exercise on computer. Exercise must be written in answer books in proper documentation.
4. Marks distribution for Practical of 60 marks is as under-

	Part I & Part II	Part III
Three Exercises of 5 marks each	30 marks	30 Marks
for Part I & II (Logic 04, Execution 04, Documentation 2) for Part III (Logic 04, Execution 04, Documentation 2)		
Viva Voce	10 Marks	15 Marks
Laboratory Exercise File	10 Marks	15 Marks
Mini Project	10 marks	

5. The student has to select one of the topics given in the syllabus for mini project.
6. Marks distribution for Project of 70 marks is as under
  - a) Project/Dissertation           40 Marks
  - b) Presentation                   15 Marks
  - c) External Viva Voce           15 Marks

Duration: 3 Hours

Maximum Marks: 70  
Minimum Marks: 25

**BCA-101: Mathematics for Computer Science**

***Instructions for Paper setters***

The question paper contains 3 sections. **Section-A** consists of 10 questions (2 questions from each unit of syllabus). **Section-B** consists of 10 questions (2 questions from each unit of syllabus). **Section-C** consists of 5 questions (1 question from each unit of syllabus). The word limit of part A, B and C are 50, 200 and 500 respectively

**Note:** Non-Scientific Calculator is allowed to be used in examination.

**Unit-I**

Matrices: Basic Definitions, matrix operations- addition, multiplication, transpose, Adjoint and inverse. Determination of a square matrix (up to 3X3 matrix)

**Unit-II**

Statements (Propositions), Logical Operations, Truth Table, Tautologies, Contradiction, Logical Equivalence, Algebra of Propositions, Conditional and bi-conditional Statement, Argument, Logical Implication, Propositional Functions, Quantifiers, Negation of Quantifiers Statements, Normal.

**Unit-III**

Integers: Properties of integers, order and inequalities, Absolute value, Mathematical Induction, Division Algorithm, Divisibility, Primes, Greatest Common Divisor(GCD), Euclidean Algorithm, Fundamental Theorem of Arithmetic, congruence Relation.

**Unit-IV**

Sets: Introduction, Sets and their representations, empty set, Finite & infinite sets, equal sets, subsets, power sets, universal sets, complements of a set. Cartesian products of sets.

**Unit-V**

Relations: Types of relations, reflexive, symmetric, transitive and equivalence relations. Functions: one to one and onto functions, composite functions, inverse of a function, Binary operations, recursively defined functions.

**Suggested Readings:**

1. Mathematics Volume I By R.D. Sharma (Dhanpat Rai Publication)
2. Mathematics Volume II By R.D. Sharma (Dhanpat Rai Publication)
3. Engineering Mathematics Volume I By S.S. sastry (Prentice-Hall of India)
4. Discrete mathematics Schaum's Series By Seymour LipSchutz, Marc Lipson (Tata McGraw Hill)
5. Discrete mathematics By Vinay Kumar (BPB)

6. Discrete mathematical Structure By Dr. K.C. Jain, Dr. M.L. Rawat.
7. NCERT Mathematics Textbook for class XI and XII

Helpstudentpoint.com

Duration: 3 Hours

Maximum Marks: 70  
Minimum Marks: 25

**BCA-102: Database Management**

***Instructions for Paper setters***

The question paper contains 3 sections. **Section-A** consists of 10 questions (2 questions from each unit of syllabus). **Section-B** consists of 10 questions (2 questions from each unit of syllabus). **Section-C** consists of 5 questions (1 question from each unit of syllabus). The word limit of part A, B and C are 50, 200 and 500 respectively

**Unit I**

Introduction: Characteristics of database approach, Advantages, Database system architecture, Overview of different types of Data Models and data independence, Schemas and instances, Database languages and interfaces; E-R Model : Entities, Attributes, keys, Relationships, Roles, Dependencies, E-R Diagram.

**Unit II**

Introduction to Relational model, Constraints: Domain, Key, Entity integrity, Referential integrity; Keys: Primary, Super, Candidate, Foreign; Relational algebra: select, project, union, intersection, cross product, different types of join operations.

**Unit III**

SQL: Data Types, statements: select, insert, update, delete, create, alter, drop; views, SQL algebraic operations; Stored procedures: Advantages, Variables, creating and calling procedures, if and case statements, loops, Functions, Triggers.

**Unit IV**

Normalization: Definition, Functional dependencies and inference rules, 1NF, 2NF, 3NF; Transactions processing: Definition, desirable properties of transactions, serial and non-serial schedules, concept of serializability, conflict-serializable schedules.

**Unit V**

Concurrency Control: Two-phase locking techniques, dealing with Deadlock and starvation, deadlock prevention protocols, basic timestamp ordering algorithm; Overview of database recovery techniques; concept of data warehousing.

**Suggested Readings:**

1. Fundamentals of Database Systems, Ramez A. Elmasri, Shamkant Navathe, 5<sup>th</sup> Ed (Pearson)
2. Database System Concepts By Korth, Silberschatz, Sudarshan (Mcgraw Hill)
3. An Introduction to Database Systems By Bipin C. Desai (Galgotia Publication.)
4. SQL, PL/SQL Programming By Ivan Bayross (BPB)
5. Commercial Application Development Using Oracle Developer 2000 By Ivan Bayross (BPB)



Duration: 3 Hours

Maximum Marks: 70  
Minimum Marks: 25

**BCA-103: Programming in C++**

***Instructions for Paper setters***

The question paper contains 3 sections. **Section-A** consists of 10 questions (2 questions from each unit of syllabus). **Section-B** consists of 10 questions (2 questions from each unit of syllabus). **Section-C** consists of 5 questions (1 question from each unit of syllabus). The word limit of part A, B and C are 50, 200 and 500 respectively

**Unit I**

Object Oriented System: Difference Between Procedural and Object Oriented Languages, Object Oriented Paradigm, Inheritance, Polymorphism, Abstraction, Encapsulation, Benefits and Application of Oops. Introduction to C++: Character Set, Token, Constants, Variables and Data Types, Enumeration Types, Operators, Expressions, Operator Precedence and Associativity, Input, Output, Conditional Statements, Scope of Variables, Type Conversion.

**Unit II**

Iteration, Break, Continue, goto; Pointers: Introduction, implementation advantage and disadvantage. Functions - Standard and User-Defined Function, Recursive Function, Passing By Value And Reference, Function Overloading Pointer and Function: Function Returning Pointer, Passing pointer as argument, Reference and Functions. Structures and Pointers. Containers.

**Unit III**

Array: introduction, advantage, One, Two and Multidimensional, Passing Array to a Function, Array and Pointers : Pointer to One and Two Dimensional Arrays, Dynamic Arrays, array containers, Array of Pointers, pointers using String Processing. Class: Introduction to Class and Object, Declaring Members and Methods in a class, declaring objects.

**Unit IV**

Functions and objects, Inline Function, Friend Functions and Its Usage, Abstract Class, Function Overriding. Constructor and Destructor- Needs and Its Usage, Types of Constructors, Destructor, Static Data Members and Methods. Inheritance - Need of Inheritance, Types of Inheritance and its implementation.

**Unit V**

Operator Overloading: Need and Rules of Operator Overloading, Overloading Through Member Function and Friend Function. Compile Time and Run Time Polymorphism- Virtual Function and virtual class. Exception Handling. Templates, Additional features of C++11, C++14 and C++17.

**References:**

1. Object Oriented Programming With C++ by E. Balagurusamy (Tata Mcgraw Hill)
2. C++ The Complete Reference by Herbert Schildt (Tata Mcgraw Hill)
3. Object Oriented Programming With C++ by Schaum Series (Tata Mcgraw Hill)
4. C++11 for Programmers (Deitel Developer) by Paul J. Deitel (Author), Harvey M. Deitel, Prentice Hall; 2nd edition
5. Professional C++ by Marc Gregoire, Nicholas A. Solter and Scott J. Kleper (Goodreads Publications)
6. A Tour of C++ by Bjarne Stroustrup, 2018
7. C++17 in Detail by Bartłomiej Filipek

Duration: 3 Hours

Maximum Marks: 70

Minimum Marks: 25

**BCA-104** Computer Networks

***Instructions for Paper setters***

The question paper contains 3 sections. **Section-A** consists of 10 questions (2 questions from each unit of syllabus). **Section-B** consists of 10 questions (2 questions from each unit of syllabus). **Section-C** consists of 5 questions (1 question from each unit of syllabus). The word limit of part A, B and C are 50, 200 and 500 respectively.

**Unit - I**

**Data Communication and Networking:** Overview, Network Types, LAN Technologies, Topologies, Models- OSI Model, TCP/IP Stack

**Unit - II**

**Physical Layer:** Introduction, Digital Transmission, modes, digital to digital, analog to digital, Analog Transmission, digital to analog, analog to analog, Transmission media, Wireless Transmission, **Switching techniques:** Circuit Switching, Packet switching, Message switching.

**Unit - III**

**Data Link Layer:** Introduction, Data Link Control: Line Discipline- Enq/Ack, Poll/Select, **Flow Control :** Stop And Wait, Sliding Window, **Error Control :** ARQ, Stop and Wait ARQ, Sliding Window ARQ.

**Unit - IV**

**Network Layer:** Introduction, Network Addressing, Routing, Internetworking, Tunneling, Packet Fragmentation, Network Layer Protocols, ARP, ICMP, IPv4, IPv6

**Unit V**

**Transport Layer:** Introduction, Transmission Control Protocol, User Datagram Protocol

**Application Layer:** Introduction, Client-Server Model, Application Protocols.

**Suggested Readings:**

1. Computer Forensics by Marie- Helen Maras
2. Data Communication and Networking By Forozan (Tata McGraw Hill)
3. Data Communication And Computer Networks By Dr. Madhulika Jain, Satish Jain (BPB)
4. William Stallings, "Data and Computer Communications", Pearson Education, 2008.
5. Rajneesh Agrawal and Bharat Bhushan Tiwari, "Data Communication and Computer Networks", Vikas Publishing house Ltd. , 2005.
6. A. S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.
7. A. Leon-Gracia and I. Widjaja, "Communication Networks", Tata McGraw Hill, 2004.

Duration: 3 Hours

Maximum Marks: 70

Minimum Marks: 25

## BCA-105 Computer Fundamentals

### *Instructions for Paper setters*

The question paper contains 3 sections. **Section-A** consists of 10 questions (2 questions from each unit of syllabus). **Section-B** consists of 10 questions (2 questions from each unit of syllabus). **Section-C** consists of 5 questions (1 question from each unit of syllabus). The word limit of part A, B and C are 50, 200 and 500 respectively

### Unit I

Basics: Block Diagram, characteristics, generations of computers, classification of computers; Binary number system, Limitations of Computers, Primary and secondary memory, Input and output devices; Computer languages: Machine language, assembly language, higher level language, 4GL. Introduction to Compiler, Interpreter, Assembler, System Softwares, Application Softwares.

### Unit II

Operating System: Features of Windows, Linux, Macintosh, Android. Open source softwares: concept and examples.

Word Processing software: different formats for saving a word document, creating, editing documents and related operations, formatting features and related operations, spelling and grammar checker, headers and footers, creating and managing tables; printing, macros, mail merge, equation editor.

### Unit III

Spreadsheet Software: Workbook, worksheets, datatypes, operators, cell formats, freeze panes, editing features, formatting features, creating formulas, using formulas, cell references.

Presentation Graphics Software: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.

### Unit IV

Overview of LaTeX; Google docs- usage and creating a document, Google sheets- usage and creating a sheet, Google slides- usage and creating slides, Google forms- usage and creating a form, Google sites- usage and creating a simple site.

### Unit V

Computer Problem Solving: Algorithms, Efficiency and analysis of algorithms, Writing algorithms for simple problems like factorial computation, generation of Fibonacci sequence and checking for prime number; Examples of unsolved problems in Computer Science.

### Suggested Readings:

1. P.K Sinha, "Computer Fundamentals", 2004
2. Rajaraman, Fundamentals of Computers, Fourth edition, Prentice Hall India Pvt. Limited, 2006
3. Peter Norton, "Introduction to Computers", 4th Edition, TMH Ltd, New Delhi, 2017.
4. R.G. Dromey, "How to solve it by Computers", Pearson Publishers, New Delhi, 2007.

5. Dorothy House, "Microsoft Word, Excel, and PowerPoint: Just for Beginners, 2015

**Web resources:**

1. <https://documentation.libreoffice.org/en/english-documentation/getting-started-guide/>
2. <https://www.coursera.org/learn/creative-problem-solving>
3. <http://web.mit.edu/rsi/www/pdfs/new-latex.pdf>
4. <https://www.latex-project.org/help/books/>
5. <https://support.google.com/docs/?hl=en#topic=1382883>
6. [https://en.wikipedia.org/wiki/List\\_of\\_unsolved\\_problems\\_in\\_computer\\_science](https://en.wikipedia.org/wiki/List_of_unsolved_problems_in_computer_science)
7. <https://www.claymath.org/millennium-problems>

Helpstudentpoint.com

Duration: 3 Hours

Maximum Marks: 70

Minimum Marks: 25

**BCA-106** Fundamentals of Computer Programming

***Instructions for Paper setters***

The question paper contains 3 sections. **Section-A** consists of 10 questions (2 questions from each unit of syllabus). **Section-B** consists of 10 questions (2 questions from each unit of syllabus). **Section-C** consists of 5 questions (1 question from each unit of syllabus). The word limit of part A, B and C are 50, 200 and 500 respectively

**Unit I**

Algorithm; Generalized Algorithms; Avoiding infinite loops in Algorithms-By Counting, by using sentinel value; Different ways of Representing an Algorithm-As a Program, As a Flowchart, As a Pseudo Code; Need for Planning a program before coding, Program Planning Tools- Flow Charts, Structure Charts, Pseudo codes

**Unit II**

Programming Techniques: Top down, Bottom up, Modular, Structured, Features, Merits, Demerits and their Comparative study. Importance of use of indentation in programming; structured Programming concepts- Need of careful use of "GoTo Statement"; Sequence Logic, selection logic, logic and iteration Logic, functions

**Unit III**

Programming Language: Types –Machine, Assembly and High –level Languages; Scripting and Natural Languages; Their relative advantages and Limitations; High Level Programming Language Tools- Compiler, Linker, Interpreter, Intermediate Language Compiler and Interpreter, Editor

**Unit IV**

Overview of some popular High Level Languages- FORTRAN, COBOL, BASIC, Pascal, C, C++, JAVA, LISP, PROLOG, PYTHON; Characteristics of a Good Programming Language; Selecting a Language out of many available languages for coding an Application; Subprograms.

**Unit IV**

Testing and Debugging: Difference; Types of Program errors ; Testing a Program; Debugging a program for Syntax Errors; Debugging a program Logic Errors; Concepts of APIs and Libraries.

Program Documentation: Need for Documenting Programs and Software; Forms of Documentation-Comments, System Manual, User Manual; Documentation Standards and Notations

**Suggested Readings-**

1. Fundamentals of Programming languages by Ellis Holowits, Springer
2. Fundamentals of Programming languages by Tolani, Pearson
3. Programming Languages: Principles and paradigms by Maurizio Gabbrielli and Simone Martini, Springer
4. Programming Language Concepts by Ghezzi, Milano, Jazayeri, Wien, John Wiley & Sons

**BCA-107 SQL (Mini Project)**

- Design a database your College Alumni Association
  - Draw an ER Diagram for a Library Management System
  - Design a database for a Hospital Management System
4. Create a table “Users” with username and passwords. Display username with its password strength (weal/average/good). Password strength should be calculated by following criteria-
- For each uppercase letter, lower case letter, number and special symbol, weight = +1
  - If password starts with a symbol other than a letter, weight = -1
  - Password with length <8, weight = +2, password length >8, weight = -2

**BCA-108 C++(Mini Project)**

1. Design your Marks sheet
2. Design Employees database using structure
3. Create your own library for Array functions
4. Design a simple calculator using templates
5. Program for reading from and writing to a random file.

**BCA 109 Computer Fundamentals (Mini Project)**

1. Suppose you are the student head of your class. Create a Google form to gather the scholastic information from the students for placements. Your form should also accept CV (pdf file) from students.
2. Build a website of your college using Google sites.
3. Build your resume in LaTeX (document preparation system). Hint- You may use [www.overleaf.com](http://www.overleaf.com) to create your resume.
4. Build a presentation to show the achievements of your college, to be presented on the annual function of your college.
5. Build your resume in Libre Writer and generate the PDF file to be mailed to a company.
6. Build your resume in Microsoft Doc and generate the PDF file to be mailed to a company.
7. Create a spreadsheet to generate the list of students to be admitted for a highly demanding program. You may take necessary assumptions about the eligibility and you may generate the list on scholastic performance of students at different levels.
8. Build a presentation showing the skills you learned in this course (Computer Fundamentals).