



PRESTIGE

INSTITUTE OF MANAGEMENT & RESEARCH, GWALIOR
MBA PROGRAMME ACCREDITED BY NBA
UGC NAAC ACCREDITED 'A' GRADE AUTONOMOUS INSTITUTE

PROGRAM /COURSE STRUCTURE AND SYLLABUS

as per the Choice Based Credit System (CBCS)
designed in accordance with
Learning Outcomes-Based Curriculum Framework
(LOCF)
of National Education Policy (NEP) 2020

for

BACHELOR OF COMPUTER APPLICATIONS (BCA)

w.e.f.

Academic Year 2021-22 and onwards



Prestige Institute of Management and Research Gwalior
BCA – Session 2021-24

PROGRAM STRUCTURE

| Semester | Course Code | Course Category | Course Title | Teaching Hrs./ Week | | | Ins. Hrs. / Week | Credit | Examination Scheme (Max. Marks) | | |
|----------|-------------|-----------------|--------------------------------------|---------------------|----------|-----------|------------------|-----------|---------------------------------|---------------------|------------|
| | | | | Lecture | Tutorial | Practical | | | Term End Examination | Internal Assessment | Total |
| I | BCA-101 | Major | Programming in C | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-102 | Minor | Computer Organization & Architecture | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-103 | GEC | Mathematics-I (Discrete Mathematics) | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-104 | AEC | Communicative English Grammar | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-105 | Major | Programming in C Lab | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | BCA-106 | Minor | IT Lab | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | | | Total | | | | 24 | 20 | | | 500 |
| II | BCA-201 | Major | Data Structure | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-202 | Minor | DBMS | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-203 | GEC | Mathematics-II (Calculus) | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-204 | AEC | Communication Techniques | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-205 | Major | Data Structure Lab | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | BCA-206 | Minor | DBMS Lab | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | | | Total | | | | 24 | 20 | | | 500 |
| III | BCA-301 | Major | Introduction to Operating System | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-302 | Minor | Object Oriented Programming in C++ | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-303 | GEC | Mathematics-III (Numerical Methods) | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-304 | SEC | Visual Basic.Net | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-305 | Major | Project I | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | BCA-306 | Minor | C++ Lab | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | | | Total | | | | 24 | 20 | | | 500 |
| IV | BCA-401 | Major | Programming in Java | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-402 | Minor | Web Technologies | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-403 | GEC | Mathematics-IV (Statistical Methods) | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-404 | SEC | Python Programming | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-405 | Major | Programming in Java Lab | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | BCA-406 | Minor | Project II | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | | | Total | | | | 24 | 20 | | | 500 |



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| Semester | Course Code | Course Category | Course Title | Teaching Hrs./ Week | | | Ins. Hrs. / Week | Credit | Examination Scheme (Max. Marks) | | |
|----------|-------------|-----------------|---|---------------------|----------|-----------|------------------|-----------|---------------------------------|---------------------|------------|
| | | | | Lecture | Tutorial | Practical | | | Term End Examination | Internal Assessment | Total |
| V | BCA-501 | Major1 | Programming in Advance Java | 3 | - | - | 3 | 3 | 45 | 30 | 75 |
| | BCA-502 | Major 2 | Software Engineering | 3 | - | - | 3 | 3 | 45 | 30 | 75 |
| | BCA-503 | DSE1 | Artificial Intelligence | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-504 | SEC | Oracle | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-506 | Intern | Internship | - | - | - | 6 | 6 | - | - | 150 |
| | | | Total | | | | 20 | 20 | | | 500 |
| VI | BCA-601 | Major1 | Computer Networks | 3 | - | - | 3 | 3 | 45 | 30 | 75 |
| | BCA-602 | Major 2 | Computer Graphics and Multimedia | 3 | - | - | 3 | 3 | 45 | 30 | 75 |
| | BCA-603 | DSE2 | Software Testing | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-604 | DSE 3 | Machine learning | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-605 | Project | Major Project | - | - | - | 6 | 6 | - | - | 150 |
| | | | Total | | | | 20 | 20 | | | 500 |
| VII | BCA-701 | Major | Data Mining | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-702 | Minor | Research Methodology | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-703 | DSE4 | Data science using Python | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-704 | Major | Data Mining Tutorial | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | BCA-705 | Project | Research project I | - | - | - | 6 | 6 | - | - | 150 |
| | | | Total | | | | 20 | 20 | | | 500 |
| VIII | BCA-801 | Major | Mobile Application Development | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-802 | Minor | Cloud Computing | 3 | 1 | - | 4 | 4 | 60 | 40 | 100 |
| | BCA-803 | Major | Mobile Application Development Tutorial | - | - | 4 | 4 | 2 | 30 | 20 | 50 |
| | BCA-804 | Project | Research project II | - | - | - | 10 | 10 | | | 250 |
| | | | Total | | | | 22 | 20 | | | 500 |



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BCA – 201 Data Structure

Course Objectives: The goal of this subject is to introduce the theory and develop the algorithm of different types of data structure. Understanding the operation of different data structure and implement in C++. Explain use and application in real life for different data structure.

Course Outcomes: At the end of the course, students will be able to

CO-1: Understand how data structures map onto physical memory.

CO-2: Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables.

CO-3: Knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.

CO-4: Compare different implementations of the same or different data structure.

Course Contents:

Unit-I

Introduction To Data Structure, Array, Records, Stacks Introduction to Stack & Primitive Operation on Stack, Stack as an Abstract Data Type, Multiple Stack, Stacks Application: Infix, Post Fix, Prefix and Recursion, Introduction to Queues, Primitive Operations on the Queues, Queue as an Abstract Data Type, Circular Queue, Dequeue, Priority Queue, Applications of Queue.

Unit-II

Pointer, It's Limitation and Operation. Linked List & their type: linear, circular & Doubly linked list, Operations on various type of linked list, application of Linked list: Polynomial manipulation.

Unit-III

Tree: General & Binary Tree. Conversion of General to Binary Tree. Binary Search Tree (BST) & It's Representation And Operation. Traversal Methods- In Order, Preorder & Post Order, Application of Binary Tree: Manipulation of Arithmetic Expression. Multiway Search Tree, Balance Tree & Their Types.

Unit-IV

Graph: Graph & Their Category & Representations, Traversing Technique: Breadth First & Depth First Search. Spanning Trees (St), Technique of Minimum Spanning Tree (MST), Application of Graphs: Pert & Related Techniques.

Unit-V

Heaps and Hash Table. Introduction to file organization; Sequential, Indexed sequential, Relative & Direct file organization. Searching : Linear & Binary Search. Sorting: Concept, selection sort, Bubble sort merge Sort, Tree sort & Partition - Exchange sort.

Suggested Text Books:

1. Trembley & Sorrenson. *Data Structure*. Tata Mcgraw Hill.
2. Salaria R.S. *Data Structures and Algorithms using C++*. Khanna Publishing.
3. Lipschuists. *Data Structure*. Schaum's Outline Series. Mcgraw Hill Publication.



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Reference Books:

1. Kruse R.L. *Data Structure and Program design in C*. PHI
2. Sahni S. & Horowitz E. *Fundamentals of Data Structure*. Galgotia Publication.

BCA – 205 Data Structure Lab

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Perform Queue operations using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to perform following operation on BST:
 - (a) Insert a Node
 - (b) Delete a Node
 - (c) Search a Node
 - (d) Traversing BST using (Inorder, Preorder, Postorder)
 - (e) Find Max Node
 - (f) Find Min Node
 - (g) Count Internal Node
 - (h) Count External Node
 - (i) Count Total Node.
12. WAP to perform following operation on Graph:
 - (a) Insert a Node
 - (b) Insert a Edge
 - (c) Search a Node
 - (d) Traversing(BFS, DFS)



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BCA – 202 Data Base Management System (DBMS)

Course Objective: This course covers fundamentals of database architecture, database management systems, and database systems. Principles and methodologies of database design, and techniques for database application development.

Course Outcomes: on completion of the course the students will be able to

CO-1: Understand key concepts of database, ER model and relational model, principles of transaction concept and distributed database.

CO-2: Acquire knowledge about Integrity rules and apply various normalization techniques.

CO-3: Execute various advance SQL queries related to relational algebra.

CO-4: Develop an enterprise data model that reflects the organization's fundamental business rules.

CO-5: Knowledge about Protection of database against crashes, Backup and Integrity violation.

Course Contents:

Unit-I

Introduction: Database system concepts, Data base system, Advantages of database systems; Data Architecture of data system: View/Schema, logical, conceptual and physical and their interrelationship DDL, DML and data dictionary, Data base administrator. Entity Relationship Model as a tool of conceptual design: Entities & Entity set, Relationship & Relationship set, Attributes, Mapping Constraints, Keys, Entity-Relationship diagram (E-R diagram): Strong & weak entities, Generalization, Specialization, Aggregation, Reducing ER diagram to tables.

Unit-II

Relational, Hierarchical and Network Model their advantages and disadvantages, storage organization for Relations. Rational Model: Structure tuple Attributes, Normalization: First, Second, Third & BCNF Normal Forms, key, primary key, Candidate key, Integrity rules: Entity integrity, Referential integrity rule.

Unit-III

Relational Algebra: Select, Project, Cross Product, Different types of Joins i.e. Theta Join, Equi Join, Natural join, Outer Join, Set Operations, Definition of Union, Set Difference, Cartesian Product, Selection, Intersection, Relational Query Language.

Unit-IV

Functional Protection and Crash Recovery: Protection, against crashes, Different types of crashes, Backup, Journal, Rollback, Committed and Uncommitted transactions, Security on Database.

Unit-V

Transaction concept, Transaction state, serializability security or Database: user identification. Physical Protection and maintenance, Transmitted of Rights. Integrity: Integrity violation, Implementation of check's in enforcing integrity; Concept of Distributed database.



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Suggested Text Books:

1. Ullman. *Principles of Database Systems*, 2e. Galgotia Publications.
2. Silberschatz, Korth, & Sudershan. *Database System Concepts*, 5e. McGraw Hill.
3. Desai, Bipin C. *An Introduction to Database System*. Galgotia Publications.

Reference Books

1. Date, C.J. *An Introduction to Data Base Systems*, 8e. Narosa Publications.
2. Patric, O`neil, & Elizabeth, O`neil. *Database Principles, Programming and Performance*, 2e. Margon Kaufmann Publishers Inc.
3. Ramez, Elmasri, & Shamkant. B. *Fundamentals of Database Systems*, 6e. Navathe Addison-Wesley.

BCA – 206 Data Base Management System (DBMS) Lab

Create and use the following database schema to answer the given queries.

Employee Schema

| Field | Type | NULL | KEY | DEFAULT |
|------------|---------------|------|-----|---------|
| Eno | Char(3) | NO | PRI | NIL |
| Ename | Varchar(50) | NO | | NIL |
| Job_type | Varchar(50) | NO | | NIL |
| Manager | Char(3) | Yes | FK | NIL |
| Hire_date | Date | NO | | NIL |
| Dno | Integer | YES | FK | NIL |
| Commission | Decimal(10,2) | YES | | NIL |
| Salary | Decimal(7,2) | NO | | NIL |

DEPARTMENT Schema

| Field | Type | NULL | KEY | DEFAULT |
|----------|-------------|------|-----|-----------|
| Dno | Integer | No | PRI | NULL |
| Dname | Varchar(50) | Yes | | NULL |
| Location | Varchar(50) | Yes | | New Delhi |

Query List

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
3. Query to display the Employee Name and Salary of all the employees earning more than \$2850.
4. Query to display Employee Name and Department Number for the Employee No= 7900.
5. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850.
6. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.



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- 7.
7. Query to display Name and Hire Date of every Employee who was hired in 1981.
8. Query to display Name and Job of all employees who don't have a current Manager.
9. Query to display the Name, Salary and Commission for all the employees who earn commission.
10. Sort the data in descending order of Salary and Commission.
11. Query to display Name of all the employees where the third letter of their name is 'A'.
12. Query to display Name of all employees either have two 'R's or have two 'A's in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.
13. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
14. Query to display the Current Date.
15. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
16. Query to display Name and calculate the number of months between today and the date each employee was hired.
17. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
18. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with 'J', 'A' and 'M'.
19. Query to display Name, Hire Date and Day of the week on which the employee started.
20. Query to display Name, Department Name and Department No for all the employees.
21. Query to display Unique Listing of all Jobs that are in Department # 30.
22. Query to display Name, Dept Name of all employees who have an 'A' in their name.
23. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
24. Query to display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees' Name who do not have a Manager.
25. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.
26. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
27. Query to display the number of employees performing the same Job type functions.
28. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
29. Query to display Name and Hire Date for all employees in the same dept. as Blake.
30. Query to display the Employee No. And Name for all employees who earn more than the average salary.



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BCA – 203 Mathematics –II (Calculus)

Course Objective: The objective of this course is to familiarize the students with core concepts of calculus.

Course Outcomes: Upon successful completion of this course students will be able to

- CO-1. Understand the key concept of differentiation, Partial derivative, curvature of a function and tracing of curves, ordinary differential equation.
- CO-2. Evaluate differentiation at different points of given interval using different theorems.
- CO-3. Analyse curvature of a function and tracing of curves.
- CO-4. Solve simultaneous differential equation of first order.
- CO-5. Knowledge about various methods to solve differential equations of first order and first degree.

Course Contents:

Unit-I

Successive, Leibnitz Theorem, Taylor's & Maclaurin's series, Curvature, Tests for Concavity and Convexity, Points of Inflection, Multiple Points, Asymptotes, Tracing of Curves in Cartesian and polar co-ordinates.

Unit-II

Partial differentiation: Function of several variables, Limits, continuity and differentiability, Partial derivatives, Euler's Theorem, Mean value theorem & Taylor's theorem for functions of two variables.

Unit-III

Maxima, Minima and saddle points of functions of two variables, Lagrange's multiplier method.

Unit-IV

Differential Equations of First Order and First Degree: Homogeneous Differential Equations, Reducible to Homogeneous Differential Equations, Linear Differential Equations, Reducible to Linear Differential Equations, Bernoulli's Equation, Exact Differential Equations, Change of Variables.

Unit-V

Linear Differential Equations of Higher order with constant coefficients, Differential Equations reducible to Linear Differential Equations with Constant Coefficients, Simultaneous differential equation of first order.

Suggested Text Books:

1. Agrawal, D.C. *Advanced Calculus*. Shree Sai Prakashan, Meerut
2. Apostol, Tom M. *One-Variable Calculus with an Introduction to Linear Algebra, Vol (I), 2e*. Wiley Eastern.
3. Raisinghania, M. D. *Ordinary and Partial Differential Equations*. S. Chand & Company Ltd.

Reference Books:

1. Stewart, J. *Calculus with Early Transcendental Functions, 7e*. Cengage Learning India
2. Hallett H. *Calculus – Single and Multivariable, 6e*. John-Wiley and Sons.



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BCA – 204 Communication Techniques

Course Objective: The course is designed to enable students to enhance ability to comprehension of spoken and written English (and use English) required for effective communication in their professional work.

Course Outcomes: On successful completion of this course students will be able to

- CO-1. Distinguish among various levels of organizational communication and communication barriers while developing an understanding of communication as a process in an organization
- CO-2. Draft effective business correspondence with brevity and clarity.
- CO-3. Demonstrate his verbal and non-verbal communication ability through presentations.
- CO-4. Use technology to communicate effectively in various settings and contexts.
- CO-5. Understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication, etc. from multiple perspectives.

Course Contents:

Unit-I

Language Skills (Listening, Speaking, Reading, Writing): An introduction, Communication: Its Process, Types and Significance, Media, Channels, Role of Communication. Communication: Principles of Communication, Barriers to Communication, Seven C'S, Verbal and Non Verbal Communication, Body Language.

Unit-II

Listening: Effective and efficient listening in various situations (discussions, lectures, news, seminars, speech, telephone calls etc.); Strategies for effective listening, Difference between Listening and Hearing.

Reading: Purpose; Comprehension; Tactics and strategies for good reading; Writing: Guidelines for good writing; various writing styles (General and Technical writing styles).

Unit-III

Presentation and delivery; role of speaker and audience; style and body language. Business Reports, Business letters, Memos, Presentation Skills, Press management, Meetings, Agenda, Notices, Minutes, Seminars, Conferences, Workshops.

Unit-IV

Group Discussion, Interview Process, Frequently asked questions, Writing Emails, PPT Presentations, Telephone Etiquettes, Negotiation Skills.

Unit-V

General and Technical documents (correspondence (applications, letters, Resumes), drafts, proposals, précis, synopsis,)

References:

1. Ajmani, J. C. (2011). *Good English: getting it right*. Rupa Publications.
2. Hasson, G. (2012). *Brilliant communication skills: What the best communicators know, do and say*. Pearson UK.

Raman, M., & Sharma, S. (2015). *Technical communication: Principles and practice*. Oxford University Press.