

P.G. Department of Computer Science & Applications

Interdisciplinary Courses Under Computer Science & Applications

Session 2026-27

Sr. No	Course Code	Program	Course Title
1.	BARM-1134 BCSM-1134 BECM-1134	Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours)Semester-I	Computer Science (Computer Fundamentals and PC Software)
2.	BARM-2134 BCSM-2134 BECM-2134	Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/Bachelor of Science (Economics) (Honours) Semester-II	Computer Science (Programming in C)
3.	BARM-3134 BCSM-3134 BECM-3134	Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester-III	Computer Science (Computer Oriented Numerical and Statistical Methods)
4.	BARM-4134 BCSM-4134 BECM-4134	Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/ Bachelor of Science (Economics) (Honours) Semester-IV	Computer Science (Data Structures using C++)
5.	BARM-5134 BCSM-5134 BECM-5134	Bachelor of Arts / Bachelor of Science (Computer Science) / Bachelor of Science (Economics)Semester - V	Computer Science (Database Management Systems)
6.	BARM-6134 BCSM-6134 BECM-6134	Bachelor of Arts / Bachelor of Science (Computer Science) / Bachelor of Science (Economics) Semester - VI	Computer Science (Web Designing and Development)
7.	BARM-1124 BECM-1124	Bachelor of Arts Honours / Bachelor of Science (Economics) Hons. Semester-I	Computer Applications (Vocational) (Computer Fundamentals and PC Software)
8.	BARM-2124 BECM-2124	Bachelor of Arts Honours/ Bachelor of Science (Economics) Hons. Semester-II	Computer Applications (Vocational) (Introduction to Programming using

			Python)
9.	BARM-3124 BECM-3124	Bachelor of Arts / Bachelor of Science (Economics) Semester-III	Computer Applications (Vocational) (Operating System)
10.	BARM-4124 BECM- 4124	Bachelor of Arts / Bachelor of Science (Economics) Semester-IV	Computer Applications (Vocational) (Database Management Systems)
11.	BARM-5124 BECM- 5124	Bachelor of Arts Honours / Bachelor of Science (Economics) Hons. Semester-V	Computer Applications (Vocational) (Web Designing and Development)
12.	BARM-6124 BECM- 6124	Bachelor of Arts Honours/ Bachelor of Science (Economics) Hons. Semester-VI	Computer Applications (Vocational) (E-Business and Digital Marketing)
13.	BCSM-6130	Bachelor of Science (Computer Science) (Honours) Semester- VI	Skill Enhancement Course (SEC) Data Visualization
14.	BHSM - 1127	Bachelor of Science (Honours) Home Science Semester-I	Computer Basics
15.	BHSM - 2126	Bachelor of Science (Honours) Home Science Semester-II	Computer Applications for Home Scientists
16.	BVRM-1126	Bachelor of Vocation (Retail Management) Semester-I	Computer Fundamentals
17.	BVNM-3125	Bachelor of Vocation (Nutrition and Dietetics) Semester-III	Technology in Nutrition and Dietetics
18.	BVNM - 5127	Bachelor of Vocation (Nutrition and Dietetics) (Semester-V)	Internet Applications
19.	BVNM - 6126	Bachelor of Vocation (Nutrition and Dietetics) (Semester-VI)	Database Concepts
20.	BVHM-2126	Bachelor of Vocation (Hospitality and Tourism)	Applications of

		Semester-II	Computer in Hospitality and Tourism
21.	BCRM-1120	Bachelor of Commerce Semester I	Computer Applications in Business
22.	BBRM-1120 / BBMM-1120	Bachelor of Business Administration Hons. Semester I / Bachelor of Business Administration (Honours) – Airlines and Airport Management Semester-I	Computer Applications for Business
23.	BBRM-5120	Bachelor of Business Administration (Three Years Degree Programme)/ Bachelor of Business Administration (Honours) (Four Years Degree Programme) Semester-V	Excel for Managers
24.	MCHM-1135	Master of Science (Chemistry) Semester-I	Computer for Chemists
25.	MZOM-1135	Master of Science (Zoology) Semester-I	Computer Programming and Data Processing
26.	MECM-3125 (Opt-IX)	Master of Science (Economics) Semester-III	Data Science for Economists
27.	FCOM-1126	Master of Commerce (FYIP) Semester-I	Digital Fluency
28.	FCOM-2126	Master of Commerce (FYIP) Semester-II	Web Based Applications for Office Management
29.	MCML - 4122	Master of Commerce Semester-IV	E - Commerce
30.	FMAM- 1135	Master Of Science (Mathematics) (FYIP) Semester I	Programming Language - I
31.	FMAM-2135	Master Of Science (Mathematics) (FYIP) Semester II	Object Oriented Programming C++
32.	FMAM-4134	Master Of Science (Mathematics) (FYIP) Semester IV	Statistical Computing Using R Programming
33.	FMAL-5133	Master Of Science (Mathematics) (FYIP) Semester -V	Machine Learning
34.	FMAL-6134	Master Of Science (Mathematics) (FYIP) Semester-VI	Data and File Structures
35.	FMAL-7134	Master Of Science (Mathematics) (FYIP) Semester-VII	Machine Learning
36.	FMAL-8134	Master Of Science (Mathematics) (FYIP) Semester - VIII	Data and File Structures

37.	BMSM-1130	Bachelor of Medical Laboratory Science Semester - I	Basics of Computer Applications
38.	MBAM- 1126	Master of Business Administration Semester I	Automated Spreadsheet Management
39.	FENM-3127	Master of Arts (English) (FYIP) Semester III	Computer Skills
40.	MBAL-4111	Master of Business Administration Semester IV	Artificial Intelligence in Business
41.	MBAL-4123 (opt. BIII)	Master of Business Administration Semester IV	Digital and Social Media Marketing

Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/

Bachelor of Science (Economics) (Honours) Semester- I

Session 2026-27

Course Code: BARM-1134

BCSM-1134

BECM-1134

COMPUTER SCIENCE

(COMPUTER FUNDAMENTALS AND PC SOFTWARE)

Course Outcomes:

After passing this course the student will be able to:

CO1: comprehend about computer hardware, operating system concepts and various system software.

CO2: Identify various input, output and memory devices.

CO3: Apply office automation software to create professional and academic documents.

CO4: Apply skills to make effective presentations and spreadsheets using associated application software.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- I
Session 2026-27**

Course Code: BARM-1134

BCSM-1134

BECM-1134

**COMPUTER SCIENCE
(COMPUTER FUNDAMENTALS AND PC SOFTWARE)**

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (08 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Fundamentals of Computer: Introduction to computer, Generations of Computers, Classification of Computers, Applications of computer, Components of computers (Input unit, Output Unit, Memory Unit & CPU), type of Software, Translators (compiler, interpreter, assembler), Booting a System.

UNIT II

Input and Output Devices: Keyboards, Mouse, Joystick, Track Ball, Light Pen and Data Scanning devices (scanner, OCR, OMR, MICR, Bar Code Reader, Card Reader), Monitor, Printers (laser printer, dot matrix printer, ink jet printer).

Memories: Concept of storage units (bit, byte, KB, MB etc.), Primary Memory-RAM and ROM. Secondary Memory- Magnetic storage devices, and Optical Storage Devices.

Operating System: meaning, purpose, Windows GUI, Command-line, Powershell overview. File Explorer

UNIT III

Word Processing: Introduction to word, Parts of window of word (Title bar, menu bar, status bar, and ruler), understanding the Ribbon, Use of Office Button and Quick Access Toolbar, Creation of new documents, opening document.

Formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. headings, styles, fonts and font size; editing, positioning, and viewing texts; finding and replacing text; inserting page breaks, page numbers, bookmarks, symbols, and dates; using tables, header, footer, macros, mail-merge; printing setup

UNIT IV

PowerPoint Presentation: Introduction to PowerPoint, starting a new slide, creating, opening and saving presentation, moving/rearranging slides, printing slides.

Applying theme to presentation, Views (slide View, slide sorter, notes view, outline view), Formatting & enhancing text formatting.

Creating a graph, displaying slide show, adding multimedia. Slide transitions, applying Animation,

Timing slide display, adding movies & sounds.

Spreadsheets using MS Excel: Spreadsheet overview, Editing, Formatting, freeze panes, using formulas and functions, sorting and filtering, pivot tables, charts and Graphs.

References:

1. Anshuman Sharma, A book of Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
2. Prof. Satish Jain, M. Geetha, Kratika, BPB's Office 2010 Course Complete Book, BPB Publications, 2017.
3. Joyce Cox, Joan Lambert and Curtis Frye, Microsoft office Professional 2010 Step by Step, Microsoft Press, 2010.
4. V. Rajaraman, Neeharika Adabala, Fundamentals of Computers, PHI Learning, 2015.
5. P.K. Sinha, Computer Fundamentals, BPB Publications, 2004.

Note: The latest editions of the books should be followed.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- I
Session 2026-27**

Course Code: BARM-1134
BCSM-1134
BECM-1134

**COMPUTER SCIENCE
(COMPUTER FUNDAMENTALS AND PC SOFTWARE)
(PRACTICAL)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Practical based on PC Software - Office.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- II
(Session 2026-27)**

**Course Code: BARM-2134
BCSM-2134
BECM-2134**

**COMPUTER SCIENCE
(PROGRAMMING IN C)**

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the working of various programming constructs involved in C Programming.

CO2: Apply various operators and control sequence of program using various control statements.

CO3: Apply programming concepts such as arrays, functions and strings to provide solution in different problem domains.

CO4: Work with pointers, structure, union and perform file handling.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- II
(Session 2026-27)**

**Course Code: BARM-2134
BCSM-2134
BECM-2134**

**COMPUTER SCIENCE
(PROGRAMMING IN C)
(Theory)**

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (08 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction: Introduction to Computer Programming, concept of algorithm, flow chart, program structure.

Program Development life cycle: Compiling and executing programs using IDE, command line.

Fundamentals of C Programming: Token, Character set, Identifiers and Key Words, Constants, Variables, Expressions, Statements, Symbolic Constants; Data types, declaring variables, initializing variables, types of integers, types of floats, strings, characters C Preprocessor directives: #define Statement, Conditional Compilation, include Files typedef, enum, Type Casting.

UNIT-II

Operations and Expressions: Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators.

Data I/O Functions: Types of I/O function, Formatted & Unformatted console I/O Functions.

Control Statements: Preliminaries, While, Do-while and For statements, Nested loops, If, if-else, ladder-if and nested if statements, Switch, Break – Continue statements.

UNIT-III

Storage Classes: Introduction to various storage classes, scope and lifetime of a variable, advantages and disadvantages.

Arrays: Types of Arrays, One Dimensional and Two-Dimensional Arrays.

Strings: Introduction to Strings and String functions and manipulation, array of strings.

Functions: User Defined & Library Function, Function (Prototype, Declaration, Definition), Methods of passing arguments, local and global functions, Recursion.

UNIT-IV

Pointers: Introduction, uses of pointers, Limitations of pointers, Difference between void pointer and Null pointer, Pointer arithmetic, operators not allowed on pointers, Types of Pointer, Passing Pointers to function, concept of pointer to pointer, dynamic memory management.

Structures & Unions: Defining and processing a structure, user defined data types, structures and

pointers, passing structures to functions, self-referenced structure, unions, Arrays and Structures.

File handling in C: Introduction, file input/output function, binary file and text file.

References:

1. E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill (2002), 5th edition.
2. Stephen G. Kochan, Programming in C, Pearson Education (2015), 4th edition.
3. Rachhpal Singh K.S. Kahlon, Gurvinder Singh, Programming in C, Kalyani Publishers (2011).
4. YashwantKanetkar, Let us C, BPB Publications (2020), 17th edition.
5. R.S. Salari, Application Programming in C, Khanna Book Publishing (2012), 4th edition.
6. Anshuman Sharma, Learn programming in C, Lakhanpal Publishers (2016), 7th edition.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- II
(Session 2026-27)**

**Course Code: BARM-2134
BCSM-2134
BECM-2134**

**COMPUTER SCIENCE
(PROGRAMMING IN C)
(PRACTICAL)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Lab based on Programming in C.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- III
Session 2026-27**

Course Code: BARM-3134

BCSM-3134

BECM-3134

**COMPUTER SCIENCE
(COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS)**

Course Outcomes:

After passing this course the student will be able to:

CO1: Solve non-linear and linear equations using different methods.

CO2: comprehend interpolation and numerical integration.

CO3: Calculate different means and deviations using statistical techniques.

CO4: Comprehend correlation, curve fitting and regression for finding solutions to various statistical problems.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- III
Session 2026-27**

Course Code: BARM-3134

BCSM-3134

BECM-3134

**COMPUTER SCIENCE
(COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS)
(THEORY)**

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. The students can use Non-programmable/ scientific & Non-storage type calculator.

Unit –I

Introduction: Numerical methods, Numerical methods versus numerical analysis, Errors and Measures of Errors. Bisection method, false position method and Newton Raphson method.

Simultaneous Solution of Equations: Gauss Elimination Method, Gauss Jordan method

Unit -II

Interpolation: Interpolation and Curve Fitting, Newton's Methods: Forward Difference Method, Backward Difference Method and Divided Difference Method.

Numerical Integration: Trapezoidal Rule, Simpson's 1/3 Rule Simpson's 3/8 Rule.

Unit -III

Measure of Central Tendency: Mean Arithmetic, Mean Geometric, Mean Harmonic, Mean, Median and Mode.

Measure of dispersion: Range, Mean deviation, Standard deviation, co-efficient of variation.

Unit –IV

Correlation: Meaning, Karl Pearson method, Rank correlation.

Regression: Meaning, Linear Regression and its coefficients.

References/ Textbooks:

1. B.S. Grewal, Numerical Methods in Engineering & Science: With Programs in C, C++ & MATLAB, Khanna Publisher, 2014.
2. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall of India Private Ltd., 2009.

Note: The latest editions of the books should be followed.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- III**

Session 2026-27

Course Code: BARM-3134

BCSM-3134

BECM-3134

**COMPUTER SCIENCE
(COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS)
PRACTICAL**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Lab exercises using a spread sheet tool for:

1. Iterative Solutions
2. Simultaneous Solution of Equations
3. Interpolation
4. Measure of Central Tendency
5. Measure of dispersion
6. Correlation
7. Regression

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- IV
(Session 2026-27)**

Course Code: BARM-4134

BCSM-4134

BECM-4134

**COMPUTER SCIENCE
(DATA STRUCTURES USING C++)**

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend various concepts of Object Oriented Programming.

CO2: Analyze complexity of algorithms to determine their efficiency and comprehend array and Linked List as base data structures.

CO3: Comprehend various hashing method, sorting and searching algorithms as well as operations of queue and stack data structures.

CO4: Comprehend advanced data structures such as tree and graph.

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- IV
(Session 2026-27)**

Course Code: BARM-4134

BCSM-4134

BECM-4134

**COMPUTER SCIENCE
(DATA STRUCTURES USING C++)
(THEORY)**

Examination Time: 3 +3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical:30

Credits: 4

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. The students can use Non-programmable/ scientific & Non-storage type calculator.

UNIT-I

Introduction to OOPs: Object Oriented Programming (OOP) v/s Procedural Programming, Encapsulation, Inheritance, Polymorphism, Abstraction.

Classes and Objects: Constructors and Destructors; Access Specifiers (public, private, protected).

Inheritance: class hierarchies, Public & Private inheritance, Levels of inheritance, Overloading v/s overriding; virtual functions, Friend Functions and Friend Classes.

UNIT-II

Data Structures: Introduction to elementary data organization, Common Operation on Data Structures, Algorithm Complexity, Big O Notation, Time-Space Tradeoff between Algorithms.

Arrays: Array defining, representing arrays in memory, various operations on linear arrays, Multi-Dimensional arrays.

Linked Lists: Types of Linked Lists, representing linked list in memory, advantages of using linked lists over arrays, various operations of linked lists, doubly linked List.

UNIT-III

Stacks: Description of stack structure, Implementation of stack, using arrays and linked lists, application of stack-converting, arithmetic expression from infix notation to polish notation and their subsequent evaluation, quicksort technique.

Queues: Description of queue structure, Implementation of queue using arrays and linked lists, description or priorities of queues, dequeues.

Sorting and Searching: Sorting Algorithms, bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, searching Algorithms, linear search and binary search, hashing.

UNIT-IV

Trees: Description of Tree Structure and its Terminology, Binary Trees and Binary Search Trees and their representation in Memory, Heapsort.

Graphs: Description of Graph Structure, Implement Graphs in Memory using Adjacency Matrix, Path Matrix, graph traversal techniques - DFS, BFS.

Files: File Organization Techniques (Sequential, Indexed).

References / Textbooks:

1. Seymour Lipschutz, Data Structures with C (Schaum's Outline Series), McGraw Hill Education (2017), 1st Edition
2. Reema Thareja, Data Structures Using C, Oxford Publication (2014), 2nd Edition
3. Sahni Horowitz, Fundamentals of Data Structures in C (2008), 2nd Edition
4. Narasimha Karumanchi, Data Structures and Algorithms made easy, Careermonk Publications (2016), 5th Edition
5. S.K. Srivastava and Deepali Srivastava, Data Structures through C, BPB Publications (2004)
6. Yedidyah Langsam, Augestein and Tanenbaum, Data Structures using C and C++, Pearson Education India (2015), 2nd Edition

**Bachelor of Arts (Honours) / Bachelor of Science (Computer Science) (Honours)/
Bachelor of Science (Economics) (Honours) Semester- IV
(Session 2026-27)**

Course Code: BARM-4134

BCSM-4134

BECM-4134

**COMPUTER SCIENCE
(DATA STRUCTURES USING C++)
(PRACTICAL)**

Examination Time: 3 +3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical:30

CA: 30

Lab Exercises based on Implementation of Data Structures using C++:

- Classes and Objects, constructors and destructors
- Data types
- Control statements
- Arrays & Strings in C++
- Searching (binary search, linear search)
- Sorting: Bubble Sort, selection sort, insertion sort, quick sort, merge sort, heap sort.
- Linked list
- Stacks (Using Arrays)
- Queues (Using Arrays)
- Trees – Traverse the BST
- Graphs-transversal, finding the shortest path
- File handling

**Bachelor of Arts / Bachelor of Science (Computer Science) /
Bachelor of Science (Economics) - Semester–V**

Session 2026-27

COURSE CODE: BARM-5134

BCSM-5134

BECM-5134

**COMPUTER SCIENCE
(DATA BASE MANAGEMENT SYSTEMS)**

Course Outcomes:

After passing course the student will be able to:

CO1: Understand data, database and database models.

CO2: Gain knowledge of keys, normalization and relational algebra.

CO3: Create, manage, access and recover databases.

CO4: Comprehend strategies for backup and recovery of databases.

**Bachelor of Arts / Bachelor of Science (Computer Science) /
Bachelor of Science (Economics) - Semester-V**

Session 2026-27

COURSE CODE: BARM-5134

BCSM-5134

BECM-5134

**COMPUTER SCIENCE
(DATA BASE MANAGEMENT SYSTEMS)
(THEORY)**

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to Databases: Overview of databases and DBMS, History and evolution of database systems.

Types of Databases: Relational, NoSQL, Object-oriented. Relational model concepts: tables, rows, columns. Comparison of database models (Hierarchical, Network, Relational). Entity-Relationship (ER) Modeling: Introduction to ER diagrams, Entities, attributes, relationships, designing a database using ER model.

UNIT-II

Relational Database Design: Converting ER diagrams to relational schemas. Relational integrity constraints.

Understanding keys: Primary, Foreign, Composite.

Normalization: 1NF, 2NF, 3NF, BCNF.

Relational Algebra: operators like selection, projection, Cartesian product, join and write queries using them.

UNIT-III

SQL Statements: DDL, DML, DCL, TCL, constraints, Join methods & Sub query, Union, Intersection, Built in Functions, View, and Security amongst users, indexing object and Common Table Expressions (CTEs).

Concurrency Control: Introduction, Concurrency control with locking methods, Two Phase locking, Precedence graph, Concurrency control based on timestamp ordering, Concurrency control based on optimistic scheduling.

Recovery: Introduction, Recovery Techniques: Log Based Recovery and Shadow Paging.

UNIT-IV

Database Security: Understanding database security concepts, User roles and permissions, Data encryption and access control measures.

Backup, Recovery, and Maintenance: Strategies for database backup and recovery, Disaster recovery planning, Regular maintenance practices for databases.

References/Textbooks:

1. C. J. Date, An Introduction to Database Systems, Pearson Education 2000.
2. F. Korth & Silverschatz, A., Database System Concepts, Tata McGraw Hill, 2010.
3. Elmasri & Navathe, Fundamentals of Database Systems, Addison-Wesley, 2011.
4. B.C.Desai, An Introduction to Database Management System, Galgotia Publication, 1991.
5. Ivan Bayross, SQL, PL/SQL - The Programming Language of Oracle, BPB Publications, 2010.
6. Gurvinder Singh, Parteek Bhatia, Simplified Approach to DBMS, Kalyani Publishers, 2016.
7. Anshuman Sharma, Fundamentals of DBMS, Lakhanpal Publications, 4th Edition.

Note: The latest editions of the books should be followed.

**Bachelor of Arts / Bachelor of Science (Computer Science) /
Bachelor of Science (Economics) - Semester–V**

Session 2026-27

COURSE CODE: BARM-5134

BCSM-5134

BECM-5134

**COMPUTER SCIENCE
(DATA BASE MANAGEMENT SYSTEMS)
(PRACTICAL)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Lab on database management system.

**Bachelor of Arts / Bachelor of Science (Computer Science) /
Bachelor of Science (Economics) - Semester–VI**

(Session 2026-27)

COURSE CODE: BARM-6134

BCSM-6134

BECM-6134

**COMPUTER SCIENCE
(Web Designing and Development)**

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend the basics of web designing and development through application of HTML.

CO2: Apply CSS and Bootstrap for generating web pages with responsive design.

CO3: Apply JavaScript to add dynamicity to the webpages.

CO4: comprehend advanced JavaScript concepts and process of web optimization.

**Bachelor of Arts / Bachelor of Science (Computer Science) /
Bachelor of Science (Economics) Semester–VI**

(Session 2026-27)

COURSE CODE: BARM-6134

BCSM-6134

BECM-6134

**COMPUTER SCIENCE
(Web Designing and Development)
(Theory)**

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section. The students can use only Non-programmable & Non-storage type calculator

UNIT-I

Introduction to Web Design and Development: Overview of web technologies and the web development process, Understanding the difference between web design and development.

Introduction to HTML: Basics: Structure of an HTML document, Common HTML elements (headings, paragraphs, lists, links, images, Tables, Linking, Frames, Forms), Semantic HTML and its importance, Introduction to DOM.

UNIT-II

CSS Fundamentals: Introduction to CSS and its role in web design, CSS selectors, properties, and values, Box model, layout techniques (flexbox, grid).

Responsive Design: Principles of responsive web design, Media queries and breakpoints, using frameworks like Bootstrap for responsive layouts.

UNIT-III

JavaScript Basics: Introduction to JavaScript and its role in web development.

Basic Programming Techniques & Constructs: Variables, data types, functions, and control structures, Operators, Functions, GET/POST Methods, DOM Manipulation & Event handling.

UNIT-IV

Forms Validation, Cookies, Inter-page communication and form data handling using JavaScript.

Web Performance Optimization: Techniques for optimizing website performance, using tools to analyze website performance, Importance and usage of SEO (Search Engine Optimization).

References/Textbooks:

1. Jon Duckett, HTML and CSS: Design and Build Websites
2. Jon Duckett, JavaScript and J Query: Interactive Front-End Web Development"

3. Jennifer Niederst Robbins, Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics
4. Ben Frain, Responsive Web Design with HTML5 and CSS
5. Ethan Brown, Web Development with Node and Express
6. Terry Felke-Morris, Web Development and Design Foundations with HTML5, McGraw Hill
7. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Cengage
8. Luke Welling and Laura Thomson, PHP and MySQL Web Development, Pearson Education

**Bachelor of Arts / Bachelor of Science (Computer Science) /
Bachelor of Science (Economics) - Semester–VI**

Session 2026-27

COURSE CODE: BARM-6134

BCSM-6134

BECM-6134

**COMPUTER SCIENCE
(Web Designing and Development)
(PRACTICAL)**

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Programming exercises based on:

- Exploring Web Technologies and Setting up the Development Environment (e.g. Visual Studio Code)
- Creating HTML Documents using headings, paragraphs, lists, links, and images
- Advanced HTML Elements (create forms), applying CSS styles, understanding Box model, Layout techniques
- Integrate Bootstrap into the project and use its grid system to create a responsive layout
- Basic JavaScript programming: GET/POST methods, DOM Manipulation, Event handling, Form validation, working with cookies
- Analyze the performance of the developed webpage using tools like Google Page Speed Insights and Understanding basic SEO

**Bachelor of Arts / Bachelor of Science(Economics) Semester I
Session 2026-27**

**COURSE CODE: BARM-1124
BECM-1124**

**COMPUTER APPLICATIONS (VOCATIONAL)
(COMPUTER FUNDAMENTALS ANDPC SOFTWARE)**

Course Outcomes:

After passing this course the student will be able to:

- CO1: comprehend about computer hardware, operating system concepts and various system software.
- CO2: Identify various input, output and memory devices.
- CO3: Apply office automation software to create professional and academic documents.
- CO4: Apply skills to make effective presentations and spreadsheets using associated application software.

Bachelor of Arts / Bachelor of Science(Economics) Semester I

Session 2026-27

COURSE CODE: BARM-1124

BECM-1124

**COMPUTER APPLICATIONS (VOCATIONAL)
(COMPUTER FUNDAMENTALS AND PC SOFTWARE)
(THEORY)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (08 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Fundamentals of Computer: Introduction to computer, Generations of Computers, Classification of Computers, Applications of computer, Components of computers (Input unit, Output Unit, Memory Unit & CPU), type of Software, Translators (compiler, interpreter, assembler), Booting a System.

UNIT II

Input and Output Devices: Keyboards, Mouse, Joystick, Track Ball, Light Pen and Data Scanning devices (scanner, OCR, OMR, MICR, Bar Code Reader, Card Reader), Monitor, Printers (laser printer, dot matrix printer, ink jet printer).

Memories: Concept of storage units (bit, byte, KB, MB etc.), Primary Memory-RAM and ROM. Secondary Memory- Magnetic storage devices, and Optical Storage Devices.

Operating System: meaning, purpose, Windows GUI, Command-line, Powershell overview. File Explorer

UNIT III

Word Processing: Introduction to word, Parts of window of word (Title bar, menu bar, status bar, and ruler), understanding the Ribbon, Use of Office Button and Quick Access Toolbar, Creation of new documents, opening document.

Formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. headings, styles, fonts and font size; editing, positioning, and viewing texts; finding and replacing text; inserting page breaks, page numbers, bookmarks, symbols, and dates; using tables, header, footer, macros, mail-merge; printing setup

UNIT IV

PowerPoint Presentation: Introduction to PowerPoint, starting a new slide, creating, opening and saving presentation, moving/rearranging slides, printing slides.

Applying theme to presentation, Views (slide View, slide sorter, notes view, outline view), Formatting & enhancing text formatting.

Creating a graph, displaying slide show, adding multimedia. Slide transitions, applying Animation, Timing slide display, adding movies & sounds.

Spreadsheets using MS Excel: Spreadsheet overview, Editing, Formatting, freeze panes, using formulas and functions, sorting and filtering, pivot tables, charts and Graphs.

References:

1. Anshuman Sharma, A book of Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
2. Prof. Satish Jain, M. Geetha, Kratika, BPB's Office 2010 Course Complete Book, BPB Publications, 2017.
3. Joyce Cox, Joan Lambert and Curtis Frye, Microsoft office Professional 2010 Step by Step, Microsoft Press, 2010.
4. V. Rajaraman, NeeharikaAdabala, Fundamentals of Computers, PHI Learning, 2015.
5. P.K. Sinha, Computer Fundamentals, BPB Publications, 2004.

Note: The latest editions of the books should be followed.

Bachelor of Arts / Bachelor of Science(Economics) Semester I

Session 2026-27

COURSE CODE: BARM-1124

BECM-1124

**COMPUTER APPLICATIONS (VOCATIONAL)
(COMPUTER FUNDAMENTALS AND PC SOFTWARE)
(PRACTICAL)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Instructions for the examiners: - Two questions of equal marks strictly as per the syllabus and based on the practical exercises covered in the semester. Questions may be subdivided into parts (not exceeding four). Candidates will attempt ONE question, explain their answer by writing on the answer sheet, and then implement the same on the computer. Examiner will evaluate both the answers (theory as well as practical). The viva should also be conducted alongside, and the student is asked viva questions related to the question and the solution he/she is working on during the exam. Students will prepare a report after analyzing print and social media advertisements along with the local market survey to understand the desktop/laptop vendors and prices. Arrange the options available as per price/performance preferences.

Lab exercises based on:

- Practice the Windows Operating System command line and the GUI for user interaction, personalization, and file management
- Document preparation with Word using the features mentioned in the syllabus
- Presentation preparation with PowerPoint using the features mentioned in the syllabus
- Spreadsheet preparation with Excel using the features mentioned in the syllabus

**Bachelor of Arts / Bachelor of Science (Economics) Semester II
(Session 2026-27)**

COURSE CODE: BARM-2124
BECM-2124

**COMPUTER APPLICATIONS (VOCATIONAL)
(INTRODUCTION TO PROGRAMMING USING PYTHON)**

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the working of various programming constructs involved in Python Programming.

CO2: Apply various operators and control sequence of program using various control statements.

CO3: Apply programming concepts such as list, tuples, dictionaries, functions and strings to provide solution in different problem domains.

CO4: Perform debugging and exception handling.

Bachelor of Arts / Bachelor of Science(Economics) Semester II

Session 2026-27

COURSE CODE: BARM-2124

BECM-2124

**COMPUTER APPLICATIONS (VOCATIONAL)
(INTRODUCTION TO PROGRAMMING USING PYTHON)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (08 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Problem Solving, Problem Analysis, Concept of writing an algorithm, drawing a flowchart, developing a program.

Introduction to Python: Python's features, Story behind the name, Python versions, Execution environments: the Python Interpreter and IDEs (e.g. PyCharm or VSCode), Getting and Setting up Python.

Python program structure: Writing your first "Hello World" program; creating, saving and executing a program; comments, Indentation.

UNIT II

Data and Expressions: Literal Constants, numbers, strings – immutable strings, quotes, the escape sequence, the format methods. Variables and Identifiers, data-types, object,

Operators & Expressions: shortcuts, evaluation order, Boolean Expressions (Conditions), Logical Operators. User Input/output.

Control Flow: Selection Control, Nested conditions, Loops, break and Continue Statements, Data Structures: list, tuple, dictionary and set; basic operations e.g. creating, indexing, slicing, membership

UNIT III

Functions: defining and calling functions, passing and returning values, local and global variables, recursive functions, Iteration vs. Recursion.

Modules: purpose and usage, the import statement, from – import statement, the __main__ attribute, creating a module and importing, the dir() function.

Handling Exceptions: try..catch and with statements, errors, debugging.

UNIT IV

Files and Strings: Opening Files, Using Text Files, Reading files, Writing files, Understanding read functions, Understanding write functions.

Introduction to numpy and pandas for data processing.

References:

1. Yashavant Kanetkar, Aditya Kanetkar, Let Us Python-6th Edition, BPB Publications.
2. Charles Dierbach, Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Wiley Publications.
3. Martin C. Brown, Python: The Complete Reference, Indian Edition, McGraw Hill Education (India) Private Limited
4. Mark J. Guzdial, Introduction to Computing and Programming in Python, Pearson Education.

Note: The latest editions of the books should be followed.

Bachelor of Arts / Bachelor of Science(Economics) Semester II

Session 2026-27

COURSE CODE: BARM-2124

BECM-2124

COMPUTER APPLICATIONS (VOCATIONAL)

(INTRODUCTION TO PROGRAMMING USING PYTHON) (PRACTICAL)

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Instructions for the examiners: - Two questions of equal marks strictly as per the syllabus and based on the practical exercises covered in the semester. Questions may be subdivided into parts (not exceeding four). Candidates will attempt ONE question, explain their answer by writing on the answer sheet, and then implement the same on the computer. Examiner will evaluate both the answers (theory as well as practical). The viva should also be conducted alongside, and the student is asked viva questions related to the question and the solution he/she is working on during the exam.

Programming exercises based on:

- Use the Python interactive interpreter
- Getting familiar with a Python IDE
- Python fundamentals, data types, operators
- Operators, flow control using if, else and elif, While statement, loops using For, Loop Patterns
- Implementation of different collections like list, tuple and dictionary and their various functions
- Demonstrating creation of functions, passing parameters and return values
- Working with modules
- Handling Exceptions
- Implementation of reading, writing and organizing files
- Basic numpy and pandas functions

Bachelor of Arts / Bachelor of Science(Economics) Semester III
Session 2026-27

COURSE CODE: BARM-3124
BECM-3124

COMPUTER APPLICATIONS (VOCATIONAL)
(OPERATING SYSTEM)

Course Outcomes:

After passing this course the student will be able to:

CO1: Compare different types of operating systems and analyze CPU scheduling algorithms.

CO2: Analyze memory management policies, threads and synchronization processes.

CO3: Comprehend about virtual memory and deadlock along with its prevention and detection.

CO4: Comprehend about disk scheduling, security and protection in Operating System.

Bachelor of Arts / Bachelor of Science(Economics) Semester III

Session 2026-27

COURSE CODE: BARM-3124

BECM-3124

**COMPUTER APPLICATIONS (VOCATIONAL)
(OPERATING SYSTEM)
(THEORY)**

Examination Time: 3 +3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical:30

Credits: 4

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (10 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction: Definition, Early Systems, Simple Batch system, Multi-programming/Multi- Tasking, Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, Real-time Systems.

Processes: Process concept, Inter Process communication, Process Scheduling, Threads. CPU-Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.

UNIT-II

Process Synchronization: Critical-section problem, semaphores, classical problem of synchronization. Semaphores

Threads: Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.

Memory Management: Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation.

UNIT-III

Virtual Memory: Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, thrashing.

Deadlocks: System Model, Deadlock characterization, methods for handling deadlocks, Deadlocks Prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock handling.

UNIT-IV

Disk Scheduling: Seek Time, Rotational Latency, Transfer Time, Algorithms.

Operating System Security: authentication & authorization, file ownership and user groups, Access Control, password vulnerabilities, strong passwords,

Protection against breaches: Operating System protection from security breaches such as runaway processes (denial of service), memory-access violations, stack overflow violations, the launching of programs with excessive privileges. Protecting against viruses and worms.

CASE STUDY: Windows Operating System, Linux.

References:

1. AviSilberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, Wiley, 2013.
2. Charles Crowley, Operating Systems: A Design-Oriented Approach, Tata McGraw Hill, 2001.
3. Deitel, An Introduction to Operating Systems, Second Edition, Addison Wesley, 1990.
4. William Stallings, Operating Systems: Internals and Design Principles, Pearson Education Limited, 2014.
5. Anshuman Sharma, Fundamentals of Operating System, Lakhanpal Publishers, 2nd Edition.

Note: The latest editions of the books should be followed.

Bachelor of Arts / Bachelor of Science(Economics) Semester III

Session 2026-27

COURSE CODE: BARM-3124

BECM-3124

**COMPUTER APPLICATIONS (VOCATIONAL)
(OPERATING SYSTEM)
(PRACTICAL)**

Examination Time: 3 +3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Practical based on Operating System.

**Bachelor of Arts / Bachelor of Science(Economics) Semester IV
(Session 2026-27)**

COURSE CODE: BARM-4124
BECM-4124

**COMPUTER APPLICATIONS (VOCATIONAL)
(DATABASE MANAGEMENT SYSTEMS)**

Course Outcomes:

After passing course the student will be able to:

CO1: Understand data, database and database models.

CO2: Gain knowledge of keys, normalization and relational algebra.

CO3: Create, manage, access and recover databases.

CO4: Comprehend strategies for backup and recovery of databases.

**Bachelor of Arts / Bachelor of Science(Economics) Semester IV
(Session 2026-27)**

**COURSE CODE: BARM-4124
BECM-4124**

**COMPUTER APPLICATIONS (VOCATIONAL)
(DATABASE MANAGEMENT SYSTEMS)
(THEORY)**

Examination Time: 3 +3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical:30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (10 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to Databases: Overview of databases and DBMS, History and evolution of database systems.

Types of Databases: Relational, NoSQL, Object-oriented. Relational model concepts: tables, rows, columns. Comparison of database models (Hierarchical, Network, Relational). Entity-Relationship (ER) Modeling: Introduction to ER diagrams, Entities, attributes, relationships, designing a database using ER model.

UNIT-II

Relational Database Design: Converting ER diagrams to relational schemas. Relational integrity constraints.

Understanding keys: Primary, Foreign, Composite.

Normalization: 1NF, 2NF, 3NF, BCNF.

Relational Algebra: operators like selection, projection, cartesian product, join and write queries using them.

UNIT-III

SQL Statements: DDL, DML, DCL, TCL, constraints, Join methods & Sub query, Union, Intersection, Built in Functions, View, and Security amongst users, indexing object and Common Table Expressions (CTEs).

Concurrency Control: Introduction, Concurrency control with locking methods, Two Phase locking, Precedence graph, Concurrency control based on timestamp ordering, Concurrency control based on optimistic scheduling.

Recovery: Introduction, Recovery Techniques: Log Based Recovery and Shadow Paging.

UNIT-IV

Database Security: Understanding database security concepts, User roles and permissions, Data encryption and access control measures.

Backup, Recovery, and Maintenance: Strategies for database backup and recovery, Disaster recovery planning, Regular maintenance practices for databases.

References:

1. Silberschatz, Korth&Sudarshan, Database Systems Concepts, McGraw-Hill Inc.(2020), 7th edition.
2. C.J. Date, An Introduction of Database System, Addison-Wesley Publishing co. (2003), 8th edition.
3. Anshuman Sharma, Fundamentals of DBMS, Lakhanpal Publishers (2016), 4th edition.
4. Ivan Bayross, SQL/PL/SQL. The Programming Language of Oracle, BPB Publications(2010), 4th edition.
5. RamezElmasri and ShamkantNavathe, Fundamentals of Database Systems, Pearson Education (2015), 7th edition.
6. P.S. Gill, Database Management Systems, Dreamtech Press (2019), 2th edition.

**Bachelor of Arts / Bachelor of Science(Economics) Semester IV
(Session 2026-27)**

COURSE CODE: BARM-4124

BECM-4124

**COMPUTER APPLICATIONS (VOCATIONAL)
(DATA BASE MANAGEMENT SYSTEMS)
(PRACTICAL)**

Examination Time: 3 +3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical:30

CA: 30

Practical on Database Management System.

Bachelor of Arts / Bachelor of Science(Economics) Semester V
Session 2026-27

COURSE CODE: BARM-5124
BECM-5124

COMPUTER APPLICATIONS (VOCATIONAL)
(Web Designing and Development)

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend the basics of web designing and development through application of HTML.

CO2: Apply CSS and Bootstrap for generating web pages with responsive design.

CO3: Apply JavaScript to add dynamicity to the webpages.

CO4: comprehend advanced JavaScript concepts and process of web optimization.

Bachelor of Arts / Bachelor of Science(Economics) Semester V

Session 2026-27

COURSE CODE: BARM-5124

BECM-5124

**COMPUTER APPLICATIONS (VOCATIONAL)
(Web Designing and Development)
(THEORY)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Instructions for the Paper Setters: –

Eight questions of equal marks (10 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to Web Design and Development: Overview of web technologies and the web development process, Understanding the difference between web design and development.

Introduction to HTML: Basics: Structure of an HTML document, Common HTML elements (headings, paragraphs, lists, links, images, Tables, Linking, Frames, Forms), Semantic HTML and its importance, Introduction to DOM.

UNIT-II

CSS Fundamentals: Introduction to CSS and its role in web design, CSS selectors, properties, and values, Box model, layout techniques (flexbox, grid).

Responsive Design: Principles of responsive web design, Media queries and breakpoints, using frameworks like Bootstrap for responsive layouts.

UNIT-III

JavaScript Basics: Introduction to JavaScript and its role in web development.

Basic Programming Techniques & Constructs: Variables, data types, functions, and control structures, Operators, Functions, GET/POST Methods, DOM Manipulation & Event handling.

UNIT-IV

Forms Validation, Cookies, Inter-page communication and form data handling using JavaScript.

Web Performance Optimization: Techniques for optimizing website performance, using tools to analyze website performance, Importance and usage of SEO (Search Engine Optimization).

References/Textbooks:

1. Jon Duckett, HTML and CSS: Design and Build Websites
2. Jon Duckett, JavaScript and J Query: Interactive Front-End Web Development"
3. Jennifer Niederst Robbins, Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics
4. Ben Frain, Responsive Web Design with HTML5 and CSS

5. Ethan Brown, Web Development with Node and Express
6. Terry Felke-Morris, Web Development and Design Foundations with HTML5, McGraw Hill
7. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Cengage
8. Luke Welling and Laura Thomson, PHP and MySQL Web Development, Pearson Education

Bachelor of Arts / Bachelor of Science(Economics) Semester V

Session 2026-27

COURSE CODE: BARM-5124

BECM-5124

COMPUTER APPLICATIONS (VOCATIONAL)

(Web Designing and Development)

(PRACTICAL)

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Programming exercises based on:

- Exploring Web Technologies and Setting up the Development Environment (e.g. Visual Studio Code)
- Creating HTML Documents using headings, paragraphs, lists, links, and images
- Advanced HTML Elements (create forms), applying CSS styles, understanding Box model, Layout techniques
- Integrate Bootstrap into the project and use its grid system to create a responsive layout
- Basic JavaScript programming: GET/POST methods, DOM Manipulation, Event handling, Form validation, working with cookies
- Analyze the performance of the developed webpage using tools like Google Page Speed Insights and Understanding basic SEO

Bachelor of Arts / Bachelor of Science(Economics) Semester VI

(Session 2026-27)

COURSE CODE: BARM-6124

BECM-6124

**COMPUTER APPLICATIONS (VOCATIONAL)
(E-BUSINESS and Digital Marketing)**

Course Outcomes:

After passing course the student will be able to:

CO1: Identify applications and models of E-Business.

CO2: Comprehend the role of CRM in E-Commerce.

CO3: Develop and analyze strategies in E-Business as well as understand process of procurement and payment.

CO4: Comprehend about ethical, legal and social issues of E-Business.

Bachelor of Arts / Bachelor of Science(Economics) Semester VI

(Session 2026-27)

COURSE CODE: BARM-6124

BECM-6124

COMPUTER APPLICATIONS (VOCATIONAL)

(E-BUSINESS and Digital Marketing)

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 3-0-1

Practical: 30

Credits: 4

CA: 30

Instructions for the Paper Setters: –

Eight questions of equal marks (10 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to E-Business and E-Commerce: Definition and scope of e-business, Evolution and history of e-business, Introduction to E-commerce, Difference between e-business and e-commerce, Advantages and challenges of e-business.

E-Business Models: B2B, B2C, C2C, C2B, B2G. Case studies of successful e-business models. Revenue models in e-business (advertising, subscription, transaction fee, sales, affiliate).

E-Business Applications: E-Tourism, Employment and Job Market Online, Online Real Estate, Online Publishing and e-Books, Online Banking and Personal Finance, On-Demand Delivery Systems and E- Grocers, Online Delivery of Digital Products.

UNIT-II

E-Marketing and Customer Relationship Management (CRM): Digital marketing strategies for E-business, SEO, SEM, and online advertising, Social media marketing and content marketing, Email marketing and customer engagement, CRM systems and their role in e-business.

E-Marketplaces: Introduction, Functions and features, types of e-Marketplaces. Auctions, characteristics and various types of auctions. Benefits, limitations and impacts of auctions.

E-Commerce in the wireless environment. E-commerce platforms and tools (Shopify, Magento, WooCommerce, etc.)

M-Commerce: Definition, advantages, types, examples and market trends.

UNIT-III

E-Business Strategy and Planning: Developing an E-business strategy, E-business planning process, SWOT analysis for e-business, E-business project management, Metrics and KPIs for e-business performance.

E-Procurement and E-Payment Systems: E-Procurement definition, processes, methods and benefits, Categories and users of smart cards, Payment methods, Payment gateways and online payment systems, Security issues in e-business.

UNIT-IV

Legal, Ethical, and Social Issues in E-Business: Legal aspects of e-business (contracts, consumer

protection, data privacy), Ethical issues in e-business (intellectual property, digital rights management), Social implications of e-business (digital divide, impact on employment), Case studies of legal and ethical dilemmas in E-business. Future Trends in E-Business.

References / Textbooks:

- Turban, E. et al., Electronic Commerce: A Managerial Perspective, Prentice Hall.
- Dave Chaffey, Electronic Business and Electronic Commerce Management, 2nd edition, Prentice Hall
- Horton and Horton, E-Learning Tools and Technologies, Wiley Publishing.
- Kamlesh K. Bajaj & Debjani Nag, E – Commerce – The Cutting Edge of Business
- Meier, & H. Stormer, E-Business & e-Commerce: managing the digital value chain, Springer Science & Business Media.

Bachelor of Arts / Bachelor of Science(Economics) Semester VI

Session 2026-27

COURSE CODE: BARM-6124

BECM-6124

**COMPUTER APPLICATIONS (VOCATIONAL)
(E-BUSINESS and Digital Marketing)**

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 3-0-1

Theory: 40

Credits: 4

Practical: 30

CA: 30

Lab exercises based on:

1. Set up a basic website using Word Press and Optimize website content for SEO (Meta tags, keyword research, URL optimization, Header tags etc.).
2. Analyze website performance using Google Analytics. Conduct keyword research using tools like Google Keyword Planner, Chat GPT, Keyword Generator, Google Search Console, Google Trends. Perform an SEO audit for a website and recommending improvements.
3. Set up a Google Ads campaign (App, Display, Local, Performance Max, Search, Smart, Shopping, and Video). Create compelling ad copy and selecting relevant keywords. Analyze PPC campaign performance and adjusting bidding strategies like Target Cost Per Acquisition (CPA), Maximize Conversions, Enhanced Cost Per Click (ECPC), Maximize Clicks.
4. Develop a social media advertising campaign on Facebook with a social media post and perform Facebook promotion using banners. Analyze the engagement metrics such as Activation rate, Number of active users, Retention rate, Churn rate, Conversion rate.
5. Create a YouTube channel for marketing.
6. Choose Mail chimp as the Email marketing platform, build a contact list in Mail Chimp, create a Campaign and build an Email, Develop the Header and body of email campaign, Enable Auto Responder performance and Tracking, Conduct A/B Testing of Emails and Start the E-Mail Marketing campaign.

Bachelor of Science (Computer Science) (Honours) Semester VI

Session 2026-27

Course Code: BCSM-6130

COMPUTER SCIENCE

SKILL ENHANCEMENT COURSE (SEC)

DATA VISUALIZATION

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: understanding of data visualization and key terms.

CO2: skills on creating visual representation of data.

CO3: develop insights how Tableau is better than excel

CO4: using interactive data visualization

Bachelor of Science (Computer Science) (Honours) Semester VI

Session 2026-27

Course Code: BCSM-6130

COMPUTER SCIENCE

SKILL ENHANCEMENT COURSE (SEC)

DATA VISUALIZATION

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 40

L-T-P: 2-0-1

Practical: 30

Credits: 3

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (08 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT - I

Introduction: Data Visualization Importance of data visualization, Advantages and Disadvantages of Data Visualization, Applications of data Visualization. Data analysis Definition, data analysis process, sensitivity analysis with data tables in excel, summarizing data with data functions, optimization with excel solver.

UNIT - II

Types of Data Visualization Techniques (Charts, Plots, Maps) Correlation and Regression coefficients, visualization of correlation and regression coefficients. Tools for visualization of Data, Tableau basic overview, tableau installation, tableau data types, working with different Visualization in Tableau.

UNIT - III

Visualizing Data process: acquiring and processing Dataset. Quick Table calculation: Running Total, Moving average, Filtering, Multiple Measures, Boolean and Numerical Formulas. Dashboard Development : Layout , Dashboard Sizzling ,Titles, Formatting. Tableau Public and Desktop: Copy, Export, Print , Print screen .

UNIT - IV

Interactive Data Visualization: Drawing with data, scales , axes, updates. Transition and motion. Common pitfalls of colour use, Visualization along Linear axis , visualization along logarithmic axes.

REFERENCES:

1. Kavitha Ranganathan, Impactful Data Visualization: Hide and Seek with Graphs, Penguin Random House India Private Limited 2023
2. Purna Chander Rao. Kathula, Hands-on Data Analysis & Visualization with Pandas, BPB Publications

3. Claus O. Wilke, Fundamentals of Data Visualization, O'Reilly, available at <https://clauswilke.com/dataviz/>
4. Jeffrey Ohlmann, Michael Fry, Data Visualization: Exploring And Explaining With Data By Cengage Learning
5. Dunlop, Dorothy D., and Ajit C. Tamhane, "Statistics and data analysis: from elementary to intermediate", Prentice Hall, 2000.
6. Joseph F Hair, William C Black et. al , Multivariate Data Analysis, Pearson Education, 7th edition, 2013.

Bachelor of Science (Honours) Home Science Semester I
Session 2026-27
Course Code: BHSM - 1127
COMPUTER BASICS
(Theory)

Course Outcomes:

After passing this course the students will be able to:

CO1: Identify and manage software, hardware and graphical user interface of a computer system.

CO2: Comprehend basic word processing skills such as text input formatting, editing, cut, copy, paste, spell check, margin, tab controls, keyboard shortcuts, printing, charts etc.

CO3: Apply skills to make effective presentations using associated application software.

CO4: Operate an email account.

Bachelor of Science (Honours) Home Science Semester I
Session 2026-27
COURSE CODE: BHSM - 1127
COMPUTER BASICS
(Theory)

Examination Time: (3+3) Hours
L-T-P: 2-0-1
Credit: 3

Max. Marks: 100
Theory: 40
Practical: 30
CA: 30

Instructions for Paper Setter -

- Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D).
- Questions of Sections A-D should be set from Units I-IV of the syllabus respectively.
- Questions may be subdivided into parts (not exceeding four).
- Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT -I

Introduction to computer and its characteristic:

Introduction to computer, Applications of computer, Types of Computers, Components of computers (Input unit, Output Unit, Memory Unit & CPU), input devices (Keyboard, Mouse, Joystick), output devices (Monitor, Printers), memory devices -RAM & ROM, software and its types, working with windows, features, desktop, using context menu, creating shortcut, working with dialog box, arranging windows, setting properties of desktop.

UNIT -II

Word Processing: Opening document, editing, formatting, use of fonts, styles and colors, exiting document. Inserting pictures from a file, inserting a Table or a chart. Copying from one document to other, using headers and footers on a document.

UNIT- III

Presentation: Presentation and its features, components, viewing a slide show using blank presentation adding text, saving, closing, opening the presentation, viewing presentation, normal view, Outline view, slide sorter view, slide show, creating a wizard using presentation, editing presentations, adding new slide, changing the new slides, editing text type, deleting the text object, interesting text boxes, formatting text, modifying slides, working with slide outlines, moving objects, copying objects, searching text, replacing text, spell check, using clip art, word Art, auto shapes.

UNIT-IV

Internet and E-mail: What is Internet, types of internet connectivity, internet service provider (ISP), Surfing Net, moving about the Web, WWW and its working, E-Mail, its features, creating and E-Mail message, Reading Mail, replying mail, draft message, sending mail.

References / Textbooks:

1. Anshuman Sharma, Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
2. Rachhpal Singh & Gurvinder Singh, Windows based computer courses, Kalyani Publisher, 2014.
3. Peter Norton, Introduction to Computers, Tata McGraw-Hill, 2006.
4. P.K. Sinha, Computer Fundamentals, BPB Publications, 2004.
5. Prof. Satish Jain, M. Geetha, Kratika, BPB's Office 2010 Course Complete Book, BPB Publications, 2017.

Note: The latest editions of the books should be followed.

**Bachelor of Science (Honours) Home Science Semester I
Session 2026-27**

COURSE CODE: BHSM - 1127

COMPUTER BASICS (PRACTICAL)

Examination Time: (3+3) Hours

L-T-P: 2-0-1

Credit: 3

Max. Marks: 100

Theory: 40

Practical: 30

CA: 30

Practical on Computer Basics.

Bachelor of Science (Honours) Home Science Semester II
(Session 2026-27)
COURSE CODE: BHSM - 2126
COMPUTER APPLICATIONS FOR HOME SCIENTISTS

Course Outcomes:

After passing this course the students will be able to:

CO1: Apply features of spreadsheet software for data manipulation, data entry, worksheet formatting, functions and formulae.

CO2: Comprehend the basics of E-Commerce and World Wide Web.

CO3: Comprehend about different electronic payment methods and multimedia devices.

CO4: Create and manage YouTube channel and blog.

Bachelor of Science (Honours) Home Science Semester II
(Session 2026-27)
COURSE CODE: BHSM - 2126
COMPUTER APPLICATIONS FOR HOME SCIENTISTS
(Theory)

Examination Time: (3+3) Hours

L-T-P: 3-0-1

Credit: 4

Max. Marks: 100

Theory: 40

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Spreadsheet Software: Workbook and worksheet, entering data, editing cell contents, Inserting and deleting rows, column, using auto-fill, creating list, formatting data, using formula

Internet: Introduction to internet, searching information on internet.

UNIT-II

WWW: Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark).

E-Commerce: Basics, Architecture, Types, Applications.

UNIT-III

Payment gateway: Popular payment methods (Net-banking, m-Banking, UPI, Debit/Credit Card, Mobile Wallets)

Multimedia & its Applications: Introduction to Multimedia and its usage, record sound using devices, using scanner, Web Camera.

UNIT IV

YouTube Studio: Navigating studio, Uploading videos, Edit Video settings, Analytics, Copyright and Monetization.

Blog Writing: Blog Domain, choice of CMS, Register a domain or subdomain with a website host.

Social Media Marketing: Social Media, Importance of Social Media, SMO Strategy for Business, Business Profile Creation, Viral Marketing, Application of Facebook and Twitter for social media marketing.

References/Textbooks:

1. Prof. Satish Jain, M. Geetha, Kratika, BPB's Office 2010 Course Complete Book, BPB Publications (2017).

2. Rachhpal Singh, Gurvinder Singh, Windows based computer courses, Kalyani Publishers (2011).
3. Anshuman Sharma, A book of Fundamentals of Information Technology, Lakhanpal Publishers (2016), 5th ed.
4. Ramesh Bangia, Introduction To Multimedia, Laxmi Publications Pvt. Ltd.(2015).
5. Laudon, E-Commerce, Pearson Education India (2016), 10th ed.
6. https://www.tutorialspoint.com/social_media_marketing/
7. <https://blog.hubspot.com/marketing/how-to-start-a-blog>

Bachelor of Science (Honours) Home Science Semester II
(Session 2026-27)
Course Code: BHSM - 2126
COMPUTER APPLICATIONS FOR HOME SCIENTISTS
(Practical)

Examination Time: (3+3) Hours
L-T-P: 3-0-1
Credit: 4

Max. Marks: 100
Theory: 40
Practical: 30
CA: 30

Note: Paper will be set on the spot by the examiner.

- 1) Microsoft Excel
- 2) Searching on Internet
- 3) Multimedia Usage
- 4) YouTube and Blog

Bachelor of Vocation (Retail Management) Semester-I

Course Code: BVRM-1126

Course Title: Computer Fundamentals

Session: 2026-27

Course Outcomes:

On Completion of this course, the student will be able to:

CO1: To understand the basic functionality of various parts of computer and terminologies related to computers and peripherals

CO2: To work with Word documents and apply various formatting techniques, page setup, creation of tables and other functions required in day-to-day word processing tasks.

CO3: To be able to make presentations, adding graphics, charts, audio, video and applying various themes and transition effects required for making an effective PowerPoint presentation.

CO4: to understand internet terms like URL, browser, search engines, and using an email account.

Bachelor of Vocation (Retail Management) Semester-I

Course Code: BVRM-1126
Course Title: Computer Fundamentals
Session: 2026-27

L - T – P

1 – 0 –1

Time: 3+3 Hours

Max. Marks: 50

Theory: 20

Practical: 15

CA: 15

Instructions for Paper Setter –

Eight questions of equal marks (04 marks each) to be set, two from each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT- I

INTRODUCTION TO COMPUTERS: Concept of Data and Information, Data Processing, Computer: Definition, Components of Computer System, and functions of each component, Classification of computers, Applications of Computers in various fields, Hardware and software, Basic Input and output devices, Memory - Primary & Secondary, commonly used secondary Storage devices.

UNIT- II

Word processing: Opening & saving files, editing word documents, converting files to different format and printing documents.

Formatting Documents:

Text Formatting- Font styles, Font selection- style, size, color etc, Type face- Bold, Italic, Underline, Case settings, Highlighting, Special symbols,

Paragraph Formatting: Alignments, Indents, Line Spacing, Margins, Bullets & Numbers

Page Setup: Setting margins, layout, and orientation.

Creation of table: Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting

Spelling & Grammar, Headers and Footers, Page numbering, Table of Contents and Mail Merge.

UNIT- III

Introduction to presentation – Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts.

Different power point views: Normal, Outline, Slide sorter, Notes and Reading view.

Creating a presentation Setting Presentation style, Selecting Slide layout, and adding content to the

Presentation

Formatting a presentation - Adding style, Color, gradient fills, arranging objects, Adding Header & Footer, Slide Background.

Adding graphics and animation to the presentation- Inserting pictures, graphics, and videos into presentation, applying transition and animation.

Slide Show: Custom Slide show, Setup Slide show: use timing, rehearse timing and recording a presentation.

UNIT- IV

Internet: Definition, Uses of Internet-Definition of Web Addressing-URL, Web Browsers.

E-mail: Anatomy of E-mail, managing an e-mail account

Note for the Practical Examiner:

- a) Practical Exam is based on the syllabus covered in the subject.
- b) The question paper will be set on the spot by the examiner.

Suggested Readings:

1. Sinha P.K., “Computer Fundamentals”, BPB Publications
2. Norton Peter, “Introduction to Computers”, McGraw Hill Education
3. Rajaraman V (Author), Adabala N, “Fundamentals of Computers”, Prentice Hall India Learning Private Limited
4. Peter Weverka, “Microsoft Office 2016 All-In-One for Dummies”, Wiley
5. Joan Lambert Curtis Frye,”Microsoft Office 2016 Step by Step”, Microsoft Press
6. Office Complete, BPB Publications

Bachelor of Vocation (Nutrition and Dietetics) Semester III
(Session 2026-27)
Technology in Nutrition and Dietetics
Course code: BVNM-3125
(Theory)

Time: 3+3 Hours

Maximum Marks: 100

L-T-P: 2-0-2

Theory: 40

Practical: 30

CA: 30

Instructions for the Paper setters: -

Eight questions of equal marks (8 Marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section. Course Content-Same for theory and practical as well.

UNIT - I

Introduction to technology used in nutrition and dietetics

Introduction to Windows: Basics, Windows Accessories, using file and program

Word Processing: Overview, creating, saving, opening, importing, exporting and inserting files, Manager, formatting pages, paragraphs and sections, indents and out dents, creating lists and numbering, Headings, styles, fonts and font size editing, positioning and viewing texts, finding and replacing text, inserting page breaks, page numbers, bookmarks, symbols

UNIT - II

Presentation Skills: Presentation Overview, entering in formation, presentation creation and dates, using tabs and tables, header, footer and printing opening and saving presentation, Power, Point elements, exploring power point menu, working with dialog boxes, Saving presentation, printing slides view, slide sorter view, notes view, outline view, formatting and enhancing text formatting, inserting audio and video.

UNIT - III

Spreadsheets: Overview, creating, saving and opening of sheets, Data analysis using different statistical parameters.

UNIT - IV

Internet: Internet and its working, Working of WWW, Web browsing (opening, viewing, saving and printing web page and bookmark), Search engines.

REFERENCES / TEXTBOOKS:

1. R.K Taxali: Introduction to software packages, Galgotia Publications.
2. MS-Office2003, BPB Publications.
3. Anshuman Sharma, Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.

4. Rachhpal Singh & Gurvinder Singh, Windows based computer courses, Kalyani Publisher, 2014.
5. Peter Norton, Introduction to Computers, Tata McGraw-Hill, 2006.

Bachelor of Vocation (Nutrition and Dietetics) Semester III
(Session 2026-27)
Technology in Nutrition and Dietetics
Course code: BVNM-3125
(Practical)

Time: 3+3 Hours

L-T-P: 2-0-2

Maximum Marks: 100

Theory: 40

Practical: 30

CA: 30

Instructions for the Paper Setters

- This paper is theory based.
- Paper will be set on the spot by the external examiner.
- Entire theory paper will be covered for Viva Voce.
- File 05 marks
- Viva Voce 05 marks

Course content:

- Introduction to Nutrition and Diet Software/Apps
- CRON-O-meter
- NutriBase
- NutriGenie
- NUT Nutrition

Suggested Websites:

- 1) ADA & Eat Right.Org
- 2) FoodSafety.Gov
- 3) WebMD Healthy Eating & Diet
- 4) CDC Nutrition Basics
- 5) HealthGuide.Org
- 6) USDA Food & Nutrition Information

Bachelor of Vocation (Nutrition and Dietetics)
(Semester-V)
(Session: 2026-27)
Internet Applications
Course Code: BVNM- 5127

Course Outcomes:

After successful completion of this course, students will be able to:

CO1: understand working of internet, services it offers

CO2: communicate via email effectively and manage email accounts efficiently

CO3: understand the working of the World Wide Web and IP Addressing

CO4: understands the working of Search engines

Bachelor of Vocation (Nutrition and Dietetics) (Semester-V)

(Session: 2026-27)

Internet Applications

Course Code: BVNM- 5127

Examination Time: 3 Hrs.

Max. Marks: 50

L-T-P: 1-0-1

Theory: 20

Credits: 2

Practical: 15

CA: 15

Instructions for the Paper Setter

Eight questions of equal marks (4 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section

UNIT –I

Introduction to Internet & it's working, Business use of Internet, Services offered by Internet

UNIT-II

Introduction to email, Advantages and disadvantages, structure of email message, working with email (sending and receiving messages), Managing email (creating new folder, deleting messages, forwarding messages, filtering messages)

UNIT-III

World wide web (www): Introduction, working and web browsing, DNS & IP addressing

UNIT-IV

Search engine: Introduction, Components and working of search engine.

References / Textbooks

1. Windows Based Computer Courses, Rachhpal Singh & Gurvinder Singh.
2. Information Technology, Hardeep Singh & Anshuman Sharma.
3. Office Complete, BPB Publications.

Bachelor of Vocation (Nutrition and Dietetics) (Semester-V)
(Session: 2026-27)
Internet Applications
Course Code: BVNM- 5127
(Practical)

Instruction to the Practical Examiner: Paper will be set on the spot by the examiner based on the content in the syllabus.

Bachelor of Vocation (Nutrition and Dietetics) (Semester-VI)
(Session 2026-27)

Database Concepts

Course code: BVNM-6126

Course Outcomes:

After completing the course, the students should learn:

CO1: comprehend the database concepts and keys implementation on tables

CO2: understands the database management using Database software.

CO3: comprehend the working with tables

CO4: understands the work with forms and reports

Bachelor of Vocation (Nutrition and Dietetics) (Semester-VI)

(Session 2026-27)

Database Concepts

Course code: BVNM-6126

Time: 3+3 Hours

Maximum Marks: 50

L-T-P:1-0-1

Theory:20

Practical:15

CA-15

Instructions for the Paper Setter

Eight questions of equal marks are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section

Course Contents

UNIT –I

Database Management System (DBMS): Meaning and need of a database, Advantages, Limitations of databases, Applications of Database, Meaning and need of DBMS, Database Components: Tables, Rows, Columns, Attributes, Queries, Record, Primary Key, Foreign Key, Creation and Relationship between tables.

UNIT-II

MS ACCESS Database Basics: Databases, Records · Fields, data types, Introduction into Microsoft Access, Starting Up Microsoft Access, creating New, and Opening Existing Databases, creating a database using a wizard, creating a database without using a wizard.

UNIT-III

Tables - What they are and how they work, create a table from scratch in Design view, Primary Keys, Switching Views, Entering Data, Manipulating Data, Linking multiple tables together

UNIT-IV

Forms -What they are and how they work. Reports - What they are and how they work. Creating a Report Using a Wizard.

Instructions for the practical examiner: -

Practical examination is to be based on topics covered in the syllabus.

Practical exam is to be set on the spot by the practical examiner.

Suggested readings: -

Access 2016 Bible, by Michael Alexander and Richard Kusleika, Wiley

MS ACCESS 2013 PLAIN & SIMPLE by Andrew Couch, PHI Learning Pvt. Ltd

Bachelor of Vocation (Hospitality and Tourism) Semester II

Session 2026-27

Course Code: BVHM-2126

**Applications of Computer in Hospitality and Tourism
(Theory)**

Time: (3+3) Hours

L-T-P:

1-0-1

Maximum Marks: 50

Theory Marks: 20

Practical Marks: 15

CA-15

INSTRUCTIONS FOR THE PAPER SETTER:

Eight questions of equal marks are to be set, two in each of the four sections (A-D). Questions of sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

Contents:

UNIT – I

Introduction to Computers: Introduction to Computer: Classification, Generations, Organization, Capabilities Characteristics & Limitations, Application of Computer in Hotels, Familiarisation with Components of Computers – Hardware: Hardware elements – input, storage, processing & output devices. Block diagram of computer.

Unit II

Introduction to Computers Software: Types of Software, System Software, Application Software, Utility Software's, Use of MS- Office: Basics of MS- Word. MS- Excel and MS-Power Point

Unit III

Internet & Applications: Introduction to Internet: Definition of networks, concepts of web page, website and web searching (browsing). Benefits, Application, Working, Hardware and Software requirements, World Wide Web, Web Browser, URL, Search Engines, Email

Unit IV

Social Media Applications and Hospitality: Introduction to Social Media, Its Role in Hospitality Promotion, Facebook – Creating Pages and Profiles, Merits/Demerits of Social Media, Linked In, Twitter and Other Social Media Applications.

References:

- 1) Alexis Leon & Mathews Leon, Vikas Introduction to Computers - Leon, 1/e Publishing.
- 2) Pradeep K. Sinha, Priti Sinha Computer Fundamentals (Sixth Edition), Published by BPB Publications, 2007
- 3) Sanjay Saxena, introduction to Computers & MS Office, Vikas Publishing.
- 4) Leon & Lion, Introduction to Computers, Vikas Publishing House, New Delhi
- 5) June Jamrich Parsons, Computer Concepts 7th Edition, Thomson Learning, Bombay.
- 6) White, Date Communications & Compute4r Network, Thomson Learning, Bombay.
- 7) Computers in Hotels – Concepts & Applications: Partho P Seal Oxford University Press
- 8) Gini Courter & Annette Marquis Ms-Office 2007 by BPB Publications

Web Links:

- 1) [https:// entrancegeek.com/five-generation-of-computer/](https://entrancegeek.com/five-generation-of-computer/)
- 2) <https://products.office.com/en-in/powerpoint>
- 3) [https:// www.businessdictionary.com/definition/internet.html](https://www.businessdictionary.com/definition/internet.html)

Bachelor of Vocation (Hospitality and Tourism) Semester II
Session 2026-27

Course Code: BVHM-2126

Applications of Computer in Hospitality and Tourism
(Practical)

Time: 3 Hours

L-T-P:

1-0-1

Maximum Marks: 50

Theory Marks: 20

Practical Marks: 15

CA:15

Practical:

WINDOWS OPERATIONS: Creating Folders, Creating Shortcuts, Copying Files/Folders, Renaming Files/Folders, Deleting Files, Exploring Windows, Quick Menus

MS-OFFICE (WORD): CREATING A DOCUMENT, Entering Text, Saving the Document, editing a Document already saved to Disk, getting around the Document, Find and Replace Operations, Printing the Document

SPECIAL EFFECTS: Print Special Effects E.g. Bold, Underline, Superscripts, Subscript, Changing Fonts, Changing Case

CUT, COPY AND PASTE OPERATION: Marking Blocks, Copying and Pasting a Block, Cutting and Pasting a Block, deleting a Block, formatting a Block, Using Find and Replace in a Block.

USING MS-WORD TOOLS: Spelling and Grammar, Printing Envelops and Labels, TABLES- Create, Delete, Format

PRINT OPTIONS: Previewing the Document, printing a whole Document, printing a Specific Page, printing a selected set, Printing Several Documents, Printing More than one Copy.

MS-OFFICE (EXCEL): How to use Excel, Starting Excel, Parts of the Excel Screen, parts of the Worksheet, navigating in a Worksheet, and Getting to know mouse pointer shapes.

MS-POWER POINT: Making a simple presentation, Using Auto Content Wizards and Templates, Slides-Creating Slides, Re-arranging, modifying, inserting pictures, objects, setting up a Slide Show.

Bachelor of Commerce Semester – I
(Session 2026-27)
Course Code: BCRM–1120
COMPUTER APPLICATIONS IN BUSINESS

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Comprehend about storage devices used in computer along with applications of computer.

CO2: Create, open, edit, format, save and print documents.

CO3: Manage tables in document and apply formulae in a spreadsheet.

CO4: Utilize spreadsheet application for data organization and manipulation through features like sort, filter, graphs, etc.

Bachelor of Commerce Semester – I
(Session 2026-27)
Course Code: BCRM–1120
COMPUTER APPLICATIONS IN BUSINESS
(Theory)

Examination Time: (3+3) Hours

Max. Marks: 100

L-T-P: 2-0-1

Theory: 40

Credit: 3

Practical: 30

CA: 30

Instructions for the Paper Setters: -

Eight questions of equal marks (08 Marks) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Basic Concepts: Characteristics of a Computer; Advantages of Computers; Limitation of Computers; Types of Computers; Applications of computers, Hardware, Firmware, Liveware; Software; System Software: Operating system, Translators, interpreter, compiler; Overview of operating system, function of operating system; Application software: General Purpose Packaged Software and tailor-made software.

Section B

Word Processing: Introduction to word-Processing, Word-processing concepts, Use of Templates and styles, working with word document: Editing text, Find and replace text, Formatting, spell check, Autocorrect, Auto-text; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, page break, table of contents

Tables: Inserting, filling and formatting a table; Inserting Pictures and Video; Mail Merge (including linking with spreadsheet files as data source); Printing documents; Citations, references and Footnotes.

Section C

Preparing Presentations: Basics of presentations: Slides, Fonts, Drawing, editing; Inserting: Tables, Images, texts, Symbols, hyperlinking, Media; Design; Transition; Animation; and Slideshow, exporting presentations as pdf handouts and videos.

Section D

Spreadsheet basics: Spreadsheet concepts; Creating a work book, saving a work book, editing a work book, inserting, deleting work sheets, entering data in a cell, formula Copying, moving data from selected cells, Handling operators in formulae: Inserting Charts- LINE, PIE, BAR, Organizing Charts and graphs; Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time.

Suggested Readings:

1. Jain, H. C. & Tiwari, H. N. —Computer Applications in Business || Taxmann, Delhi.
2. Joseph, P.T., S.J. E-Commerce: An Indian Perspective, 6th ed. PHI Learning
3. Mathur, S. & Jain, P. —Computer Applications in Business || Galgotia Publishing Company
4. Madan, S. —Computer Applications in Business || Scholar Tech Press, Delhi.
5. Sharma, S.K. & Bansal, M. —Computer Applications in Business || Taxmann, Delhi.
6. Thareja R (2019). Fundamentals of Computers. Oxford University Press.
7. Thareja R (2018). IT & Its Business Application. Oxford University Press.

Note: Latest edition of text books to be followed.

(Session 2026-27)
COURSE CODE: BBRM-1120/ BBMM-1120
COMPUTER APPLICATIONS FOR BUSINESS

COURSE OUTCOMES

After passing this course the student will be able to:

CO1: Comprehend the basic knowledge of computer, its components, Input/output and memory devices of computer.

CO2: Articulate various internal and external commands used in Disk Operating System.

CO3: Apply word processing software to create, edit and format documents.

CO4: Manage spreadsheets and presentations using associated application software.

(Session 2026-27)
COURSE CODE: BBRM-1120/ BBMM-1120
COMPUTER APPLICATIONS FOR BUSINESS

Examination Time: 3+3 Hours

Max. Marks: 100

L-T-P

Theory:40

2-0-1

Practical: 30

CA:30

Instructions for Paper Setter -

Eight questions of equal marks (08 Marks) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT- I

Computer Fundamentals: Definition of computer, Components of a computer system, Brief history of evolution of computers and generation of computers.

Internal and External Memory Storage: RAM, ROM, PROM, EPROM. Commonly used Input / Output/Memory storage devices: Punched Card, VDU, CRT. Difference between Hardware & Software. Types of software system. Software & Application software, Interpreter.

UNIT-II

Operating System: Definition, Types of operating on the Basis of processing. Introduction to various types of operating system such as windows & DOS Overview and Anatomy of windows, Working with files and folder in windows. Basic Commands of Internal & External commands in DOS.

UNIT-III

Word Processor: Overview, Creating, Saving, Opening, Importing, Exporting and Inserting files. Formatting pages, paragraphs and sections. Indents and outdates. Creating lists and numbering. Heading Styles, Fonts and size editing, positioning& viewing text. Finding and replacing text, inserting page breaks, page numbers, book marks, symbols & dates. Using tabs and tables Header, Footer & Printings.

UNIT-IV

Spreadsheet: Worksheet overview. Entering information. Worksheet. Opening and saving workbook. Formatting number and texts. Protecting cells. Producing Charges and printing operations graph.

Presentation: Presentation Basics Menus and Toolbars, Opening and saving and existing presentation creating and saving a presentation using auto content wizard. Design Template Blank Presentation. The slides sorter view. Insert slides from another presentation. Inserting pictures and graphics. Slide show, printing, slides.

References:

1. Peter Norton, Introduction to Computers, Tata McGraw-Hill, 2006.
2. Sanjay Sexana, A First Course in Computers, Vikas Publishing House, New Delhi, 2015.
3. V. Rajaraman, Neeharika Adabala, Fundamentals of Computers, PHI Learning, 2015.
4. Dr. S.S Srivastava., MS-Office, Firewal Media, New Delhi, 2008.
5. Anshuman Sharma, A book of Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.

Note: The latest editions of the books should be followed.

Bachelor of Business Administration (Honours) (Four Years Degree Programme)

Semester V

(Session 2026-27)

Course Code: BBRM-5120

EXCEL FOR MANAGERS

COURSE OUTCOMES:

After passing this course the student will be able to:

CO1: Understand the interface and core features of MS Excel for business applications

CO2: Understand how to use excel functions to manage, organize and present business data effectively

CO3: Understand use of logical functions for decision making in datasets

CO4: Create dynamic models for efficient data handling and reporting

**Bachelor of Business Administration (Three Years Degree Programme) /
Bachelor of Business Administration (Honours) (Four Years Degree Programme)
Semester V
(Session 2026-27)
Course Code: BBRM-5120
EXCEL FOR MANAGERS**

Examination Time: (3+3) Hours

Max. Marks: 100

L-T-P: 2-0-1

Theory: 40

Credit: 3

Practical: 30

CA: 30

Instructions for the Paper Setters: -

Eight questions of equal marks (08 Marks) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction to Excel, Understanding Advanced Features of Excel: Text functions (Concatenate, Left, Right, Mid, Length, Proper, Upper, Lower, Trim, Replace, Substitute), Logical functions (including nested functions) Data Filter and Sort. Creating Dynamic Models.

Section B

Understanding basic mathematical functions, Describing data: Descriptive statistics, Moving Average, Random Number generator, Rank and Percentile, Variance, Standard deviation, illustrating data using Scatter Plot, Bar chart and Histogram

Section C

Measuring and incorporating Risk in Capital Budgeting projects: PV, FV, NPV, IRR, Computation of debt or loan repayment using excel, amortization functions i.e. PMT, IPMT, PPMT

Section D

Data Analysis: Estimating a simple and multiple regression using Data Analysis Tool Pack, Plotting a simple and multiple regression, plotting the least square residuals, Prediction using Excel.

Suggested Readings:

1. Danielle Stein Fairhurst "Financial Modeling in Excel for Dummies" 2017
2. Oluwa Shmuel, "Hands-On Financial Modeling with Microsoft Excel 2019: Build practical models for forecasting, valuation, trading, and growth analysis using Excel", Pack Publishing, 2019
3. Paul Pignataro "Financial Modeling and Valuation: A Practical Guide to Investment Banking and Private Equity" (Wiley Finance) Hardcover –2013
4. Barlow, John F. "Excel Models for Business and Operations Management". Wiley India Pvt. Limited, 2nd Edition, 2005.

Note: Latest edition of text books to be followed.

Master of Science (Chemistry) Semester - I
Session 2026-27

COMPUTER FOR CHEMISTS
COURSE CODE: MCHM – 1135

COURSE OUTCOME

After passing this course the student will be able to:

CO1: Comprehend various programming constructs like variables, data-types, operators, etc of C programming language.

CO2: Apply various control statements of C Programming Language for designing solutions to different real-world problems.

CO3: Comprehend signature, declaration, definition and calling of functions in C for modularization of problem.

CO4: Implement single and multidimensional arrays for representing complex data collections and Role of AI in the field of Chemistry.

Master of Science (Chemistry) Semester - I
Session 2026-27

COMPUTER FOR CHEMISTS
COURSE CODE: MCHM - 1135

Examination Time: (3+3) Hours

Max. Marks: 100

L-T-P: 2-0-1

Theory: 40

Credits: 3

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (08 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to programming, algorithms and flowcharts.

Elementary programming, a typical C program, print function.

Introduction of declarations, assignments and variables: concept of an integer, concept of a variable, rules for naming variables, Data Types, assignment statement, arithmetic operators.

Integer arithmetic expressions, relative priority of arithmetic operators, use of parenthesis, modulus operator.

UNIT-II

Input/Output Functions, Decision making in C, relational operators, logical operators, if statement, if else statement, nesting of if statement.

The while loop, do while loop, for loop, nested for loop.

UNIT-III

Type char and ASCII code, character strings and how to print them, octal and hexadecimal notation.

User defined functions, returning value from a function, functions with more than one parameters.

UNIT-IV

Arrays, declaring an array, initializing an array, break statement, strings and character arrays, sorting an array, finding maximum and minimum in an array, multidimensional arrays. Input and output.

Introduction to AI and its role in the field of Chemistry, Role of AI in drug discovery, Ethical AI and Future Trends

References / Textbooks:

1. K.V. Raman, Computers in Chemistry, Tata McGraw Hill, 1993.
2. Henry Mullish, Herbert L. Cooper, The Spirit of C: An Introduction to Modern Programming, Jaico Publications, 1987.
3. Anshuman Sharma, Learn Programming in C, Lakhanpal Publishers, 7th Edition.
4. E Balagurusamy, Programming in ANSI C, Tata McGraw-Hill, 2002.
5. Yashvant Kanetkar, Let Us C, BPB Publications, 2016.
6. Byron Gottfried, Schaum's Outline Programming with C, McGraw Hill, 1996.

Note: The latest editions of the books should be followed.

Master of Science (Zoology) Semester–I
Session 2026-27
COMPUTER PROGRAMMING AND DATA PROCESSING
COURSE CODE: MZOM-1135

COURSE OUTCOME

After passing this course the student will be able to:

CO1: Comprehend computer fundamentals, operating system concepts and office automation software.

CO2: Work with complete office suite for making spreadsheets, documents and presentations.

CO3: Comprehend basics of C Programming Language.

CO4: Apply various control statements and arrays of C Programming Language for designing solutions to different real-world problems.

Master of Science (Zoology) Semester-I
Session 2026-27

COMPUTER PROGRAMMING AND DATA PROCESSING
COURSE CODE: MZOM-1135

Examination Time: (3+3) Hours

Max. Marks: 100

L-T-P: 2-0-1

Theory: 40

Credits: 3

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (8 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT - I

Introduction to Computer capabilities, Classifications.

Computer components, Introduction to hardware and software concepts, operating systems, peripherals, I/O devices, Limitations of computer.

UNIT - II

Basic Features and usage of:

Word Processing Software: Creating, Editing, Formatting and Printing document

Spreadsheet Software: Creating, Editing, Formatting and Printing a sheet

Presentation Software: Creating, Editing, Formatting and Printing a presentation

UNIT- III

Introduction to C Programming language.

Program structure, elements, character set, constants, variables, data types, identifiers, operators and expressions.

I/O Statements: printf and scanf statement.

UNIT - IV

Control statements: if, if else, else if ladder, nesting, switch, Looping statements: do while, while, for

Arrays: Basic usage, Declaration, Initialization and Types.

References / Textbooks:

1. Anshuman Sharma, Learn Programming in C, Lakhanpal Publishers, 7th Edition.
2. E Balagurusamy, Programming in ANSI C, Tata McGraw-Hill, 2002.
3. Yashvant Kanetkar, Let Us C, BPB Publications, 2016.
4. Gurwinder Singh, Rachhpal Singh, Fundamentals of Computer and PC Software, Kalyani Publishers, 2015.
5. Anshuman Sharma, Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
6. Byron Gottfried, Schaum's Outline Programming with C, McGraw Hill, 1996.

Note: The latest editions of the books should be followed.

Master of Science (Economics) Semester III
Session 2026-27
DATA SCIENCE FOR ECONOMISTS
Course Code: MECM-3125 (Opt-IX)

Examination Time: (3+3) Hrs.

Max. Marks: 100

L-T-P: 2-1-2

Theory: 40

Credits: 5

Practical: 30

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT - I

Data Analysis: Sources, acquisition and interpretation of data, primary and secondary data.

Quantitative and qualitative data, graphical representation of data with histogram, line charts, pie chart, bar chart, column chart and box plot.

Data Visualization and Report Writing: Characteristics of effective graphical display, ideas and Tools for data visualization, different steps in report writing, layout of the research report, types of reports. APA, MLA and Chicago reference styles.

UNIT - II

Data Communication and Internet: Introduction to Data Communication, Types of Networks.

Transmission Media- wired and wireless, Internet and its applications, working knowledge of Search Engines. Threats to information and prevention mechanisms – Antivirus, Firewalls, Biometric controls.

UNIT - III

Introduction to Big Data: Structured and Unstructured data, Data Analytics, Big data management and big data analytics techniques of data management, storage and analysis of data, extraction of relevant information. Use of big data in networking – retail industry, healthcare industry.

UNIT - IV

Introduction to Cloud Computing: benefits, challenges and risks, different types of clouds. Overview of distributed computing: Trends of computing, introduction to parallel/distributed computing. Cloud Computing Architecture: Service Models, Deployment Models, Cloud Clients, Service Level Agreement (SLA) and Quality of Service (QoS) in Cloud Computing.

References / Textbooks:

1. Michael Minelli, Michele Chambers, AmbigaDhiraj, “Big Data. Big Analytics”, John Wiley.
2. Cathy O’Neil and Rachel Schutt. Doing Data Science, Straight Talk from TheFrontline, O’Reilly, 2017
3. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., ISBN–13: 978–8–12–652980–3, New Delhi, India 2016
4. Dr. Saurabh Kumar, Cloud Computing: Insights into New–Era Infrastructure, Wiley India Pvt. Ltd, ISBN–13: 978–8–12–652883–7, New Delhi, India, 2011.
5. Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Cloud Computing for dummies, Wiley India Pvt. Ltd, ISBN–13: 978–0–47–059742–2, New Delhi, India, 2011.

6. Cloud Computing: Principles and Paradigms – 2013 by Rajkumar Buyya, James Broberg, Andrzej Goscinski.
7. Gurvinder Singh and Rachhpal Singh Windows Based Computer System, Kalyani Publishers

Master of Commerce (FYIP) Semester I
(Session 2026-27)
COURSE CODE: FCOM-1126
DIGITAL FLUENCY

Course Outcomes:

After passing course the student will be able to:

CO1: The course will help students examine document creation for report making and communication.

CO2: Good presentation skills will be inculcated in students.

CO3: Develop analytical skills for better understanding of the business environment and decision making.

CO4: The spreadsheet knowledge acquired through this paper will assist students in solving real life problems that help in decision making.

Master of Commerce (FYIP) Semester I
(Session 2026-27)
COURSE CODE: FCOM-1126
DIGITAL FLUENCY

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 2-0-2

Theory: 40

Credit: 4

Practical: 30

CA: 30

Instructions for the Paper Setter:

Eight questions of equal marks (8 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Word Processing:

- Shortcuts for navigation, insertion, deletion, and selection
- Formatting fonts with bolding, bullets and numbers
- Creative use of cut, copy and paste
- Format painter
- Find and Replace Text
- Tables
- Graphics, Smart Art, watermarks, hyperlinks, print screen function and Word art
- Page numbering
- Borders and shading
- Headers/footers
- Shortcut features like AutoCorrect, quick sections, find and replace
- Page breaks, drop caps
- Spelling, grammar, thesaurus
- Citations, references and Footnotes.

UNIT-II

Spreadsheets:

- Navigation and keyboard shortcuts
- Text, number and date shortcuts
- Add columns, rows (Autosum, auto-calculate)
- Manual math formulas (average, count, etc.)
- Use “cell references” with formulas
- Copy formulas (fill handle)
- Cut, copy, paste spreadsheets, range, and formulas
- Delete/insert rows and columns
- AutoCorrect
- Print options (orientation, margins, gridlines, header/footer)

UNIT-III

- Create charts to illustrate your spreadsheets; revise and format charts
- Create, sort and filter lists
- Apply formatting options, including conditional formatting
- Protecting worksheets
- Organizing Charts and graphs

- Flash-fill

Presentations:

- Slide content: planning, opening slides, sequencing
- Bullet/number slides(variations, sequencing, layout)
- Graphics, shapes(alternatives to bullets; use color to influence mood; use images to reinforce messages)
- Smart art(effective use of diagrams)

UNIT-IV

- Photos and internet photos(formatting options)
- Copy/paste shortcuts(from other programs; linking)
- Create/import org charts, graphs and tables
- Hyperlinks to others programs and the internet
- Insert media clips, movies, sounds
- Views: Slide sorter, Outline, Notes as editing and presentation tools
- Presenting: transitions, animation, hiding slides, pausing and highlighting
- Automatic presentations (narrations, timing)
- Presentation methods to connect with individuals and groups

References:

1. Anshuman Sharma, A book of Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
2. Jain, H. C., & Tiwari, H. N. (2021). Computer Applications in Business. Taxmann, Delhi.
3. Mathur, S., & Jain, P. (2016). Computer Applications in Business. Galgotia Publishing Company
4. Madan, S. (2020). Computer Applications in Business. Scholar Tech Press, Delhi.
5. Sharma, S. K., & Bansal, M. (2017). Computer Applications in Business. Taxmann, Delhi.
6. Thareja, R. (2019). Fundamentals of Computers. Oxford University Press.
7. Thareja, R. (2018). IT & It's Business Application. Oxford University Press.
8. Walkenbach, J. (2016). MS Excel. Bible. John Wiley & Sons, USA.

Note: The latest editions of the books should be followed.

Master of Commerce (FYIP) Semester II
(Session 2026-27)
COURSE CODE: FCOM-2126
WEB BASED APPLICATIONS FOR OFFICE MANAGEMENT

Course Outcomes:

After studying this course, students will be able to:

CO1: use internet and manage email effectively

CO2: learn about WWW and search engine.

CO3: create google document, google form and scheduling of meeting through google calendar.

CO4: hold and manage various online virtual meetings

Master of Commerce (FYIP) Semester II
(Session 2026-27)

COURSE CODE: FCOM-2126

WEB BASED APPLICATIONS FOR OFFICE MANAGEMENT

Examination Time: 3 Hrs.

Max. Marks: 100

L-T-P: 2-0-2

Theory: 40

Credit: 4

Practical: 30

CA: 30

Instructions for the Paper Setter:

Eight questions of equal marks (8 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT - I

Introduction: About internet and its working, business use of internet, services offered by internet, evaluation of internet, internet service provider (ISP), internet addressing (DNS) and IP addresses).

E-Mail: Basic Introduction; Advantage and disadvantage, structure of an e-mail message, working of e-mail (sending and receiving messages), managing e-mail (creating new folder, deleting messages, forwarding messages, filtering messages) Implementation of outlook express.

UNIT – II

Internet Protocol: Introduction, file transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCP IP.

WWW: Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark)

Search Engine: About search engine, Components of search engine, working of search engine, difference between search engine and web directory

UNIT – III

Introduction to Web based tools for Office Management:

Google Docs: Creating documents, uploading files to Google Drive, managing files and sharing files on Google Drive, Editing Documents, sharing documents, changing ownership of the document.

Google Forms: Creating a Questionnaire/ Quiz using Google Forms Using Google Calendar to organize and track online meeting, Using Telegram, WhatsApp Web to communicate and share documents online.

UNIT – IV

Online Platforms for Virtual Meeting: Google Meet, Microsoft Teams, Zoom Online meeting, Cisco Webex., Scheduling and conducting Online Meetings

Online Payment Methods: Internet banking, UPI, Debit and Credit Cards, Mobile Wallets.

References:

1. Internet & web page designing by V.K.Jain BPB publications.
2. Alexis Leon and Mathews le on, Internet for everyone - Vikas publications.
3. Internet for dummies - Pustakmahal, New Delhi a beginner's guide to html
4. “Understanding the Internet”, Kieth Sutherland, Buterworth–Heineman; 1st Edition
5. S. K. Bansal, “Internet Technologies”, APH Publishing Corporation.
6. Behrouz A. Forouzan, “Data Communications and Networking”, 3rdEditon.

MASTER OF COMMERCE SEMESTER- IV
(Session 2026-27)
COURSE CODE: MCML - 4122
E-COMMERCE

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend the basic terms of E-Commerce, aims, benefits and E-Commerce models.

CO2: Acquaint about the working and components of EDI.

CO3: Identify Electronic Payment systems, various issues involved in relation to secure electronic transactions and various E-Payment options.

CO4: Comprehend BPR and Case Studies of E-Business related applications.

MASTER OF COMMERCE SEMESTER- IV
(Session 2026-27)
COURSE CODE: MCML - 4122
E-COMMERCE

L-T-P: 4-0-0

Credits: 4

Examination Time: 3 Hrs.

Max. Marks: 100

Theory: 70

CA: 30

Instructions for Paper Setter -

Eight questions of equal marks (14 marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I

Introduction to E – Commerce: Meaning and Concept, Features, Benefits, E-Commerce v/s. Traditional Commerce. E-Commerce Framework, VAN and EDI as Promoters. E-Commerce Models.

Steps involved in opening your own online business, Role of Website and the technologies needed to build a website.

UNIT-II

Electronic Data Interchange: EDI Vs Traditional Systems, components and working of EDI system, EDI implementation issues, Factors for successful EDI Implementation, EDI service providers in India.

UNIT-III

Concerns for E – Commerce: Legal and regulatory issues, Laws for E – Commerce, E-Commerce in India, Sections of IT Act for E-Commerce transactions.

Electronic Payment Systems: Various Methods of Electronic Payments – Google pay, Paytm, Debit and Credit Cards, UPI. E-Commerce security Issues and Measures.

UNIT-IV

Re – Engineering for Change: Business process re – engineering (BPR), Methodology and Planning Methods for change.

Case Studies: To demonstrate usefulness of E – Commerce in various business areas like Banks, Reservations, E-Governance and E-Retailing.

References/Textbooks:

1. Laudon, Kenneth C and Guercio: E-Commerce, Pearson Education India (2016), 10th edition.
2. David Whiteley, E - Commerce: Strategy, Technologies and Applications, McGraw Hill Education (2017).
3. Kamlesh Bajaj, Debjani Nag, E-Commerce: The Cutting Edge of Business, McGraw Hill Education (2017), 2nd edition.
4. Nidhi Dhawan, A Handbook of E-commerce, Sun India Publications (2017).
5. Janice Reynolds, The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based Business, CRC Press (2004), 2nd edition.

6. SyamalesMaiti, SweetySadhukhan, E-commerce and business communication, McGraw-Hill (2019), 1st edition.

Master of Science (Mathematics) (FYIP)
Semester-I
Session-2026-27
Course Title: Programming Language - I
Course Code: FMAM- 1135

Course Outcomes:

After passing course the student will be able to:

CO1: Articulate various kind of software and hardware used in computers.

CO2: Work with different set of operations in C programming.

CO3: Apply various control statements of C Programming Language for designing solutions to different real world problems.

CO4: Implement single and multidimensional arrays for representing complex data collections

Master of Science (Mathematics)(FYIP)
Semester-I
Session-2026-27
Course Title: Programming Language - I
Course Code: FMAM- 1135

Examination Time: (3+3) Hours

Max. Marks: 100

Practical-30

Theory: 40

CA: 30

L T P

3 0 1

Instructions for the Paper Setters: Eight questions of equal marks (8 Marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Unit I

Introduction to Computer Programming, Program Development life cycle, algorithms, flow chart, decision table & pseudo code.

Unit II

Introduction to C language, data types, Operators and Expression, Input/output Functions, Structured programming elements, Control statements: Branching, Jumping, Looping Arrays.

Unit III

Pointers, Functions: Inbuilt Functions, User defined Functions, Recursion, Storage Classes in C, dynamic memory management.

Unit IV

Strings, Structure and union, Reference variables, basics of searching and sorting techniques, file handling in C

References / Textbooks:

1. E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill (2002), 5th edition.
2. Stephen G. Kochan, Programming in C, Pearson Education (2015), 4th edition.
3. R.S. Salari, Application Programming in C, Khanna Book Publishing (2012), 4th edition.
4. Anshuman Sharma, Learn programming in C, Lakhanpal Publishers (2016), 7th edition.

Master of Science (Mathematics)(FYIP)
Semester–II
Session-2026-27
Course Title: Object Oriented Programming C++
Course Code: FMAM-2135

Course Outcomes:

After the completion of this course, the student will be able to:

CO1: Comprehend the concepts of Object-Oriented Programming Paradigm.

CO2: Identify the use of access specifiers and different types of constructors in class.

CO3: Apply function and operator overloading.

CO4: Comprehend different types of inheritance and polymorphism.

Master of Science (Mathematics)(FYIP)
Semester–II
Session-2026-27
Course Title: Object Oriented Programming C++
Course Code: FMAM-2135

Examination Time: 3 Hours

Max. Marks: 100

Practical-30

Theory: 40

CA: 30

L T P

3 0 1

Instructions for the Paper Setters:

Eight questions of equal marks (8 Marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Unit I

Getting Started: Introduction. A brief history of C++, Variable, Constant, Expression, Statements, Comments and keywords of C++.

Operator: Arithmetic, Relational, Logical, Assignment, Increment/Decrement, Conditional, Precedence of Operators. Datatype, Type conversion, library function.

Input/output Statements: Inputting using c in and outputting using c out statements, Pre-processor directives.

Basic Program construction: A complete C++ program: invoking Turbo C++, naming your program, using the editor, saving your program, compiling and linking, running the program Errors: Compiler, linker and runtime.

Other IDE features: Compiling and linking, shortcut exiting from IDE, examining files, opening an existing file, DOS shell.

Unit II

Programming Paradigms: Introduction to the object oriented approach towards programming by discussing Traditional, Structured Programming methodology.

Objects & Classes: Object Definition, Instance, Encapsulation, Data Hiding, Abstraction, Inheritance, Messages, Method, Polymorphism, Classes.

Object Oriented Programming using C++: Characteristics of OOP, Overview of C++, Objects and Classes, Member functions and data, private & public, constructor & destructor, Constructor Overloading, Types of Constructors.

Unit III

Operator Overloading: Overloading unary operators, overloading binary operators, Data conversion, Pit-falls operator overloading and conversion.

Function Overloading: Function Overloading, Default Arguments, Ambiguity in Function Overloading.

Unit IV

Inheritance: Concept of inheritance, Base & derived classes, Access Specifiers, Class Hierarchies, Types of Inheritance with examples.

Polymorphism: Virtual functions, friend functions, static function, this pointer, polymorphism, Types of Polymorphism with examples, Templates

References / Textbooks:

1. Herbertt Schildt, C++: The Complete Reference, Tata McGraw-Hill Education India, 4th Edition.
2. Bjarne Stroustrup, The C++ Programming Language, Addison – Wesley Professional (2013), 4th Edition
3. G.S. Baluja, C++ Program Design (w/CD), Khanna Book Publishing Company (2015), 2nd edition.
4. Stanley Lippman, Josee Lajoie, Barbara Moo, C++ Primer, Addison-Wesley Professional (2012), 5th edition.
5. Richard Johnsonbaugh and Martin Kalin, Object Oriented Programming in C++, Pearson Education (1999), 2nd Edition

Master of Science (Mathematics) (FYIP)
Semester–IV
Session-2026-27
Course Title: Statistical Computing Using R Programming
Course Code: FMAM-4134

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend basics of Statistical Computing and managing data structures like vector, matrix, etc.

CO2: Create, operate and manage lists and data frames.

CO3: Apply control and I/O statements for generating outputs.

CO4: Simulate various descriptive and analytical algorithms using R language along with their visualization.

Master of Science (Mathematics) (FYIP)
Semester–IV
Session-2026-27
Course Title: Statistical Computing Using R Programming
Course Code: FMAM-4134

Examination Time (3+3) Hours

Max. Marks: 100

Theory: 40

Practical: 30

CA: 30

L T P

3 0 1

Instructions for Paper Setters:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit I

Data Statistics: Sampling, Cumulative statistics, Statistics for Data frames, matrix objects and lists. Introduction to R, help functions in R, Vectors, Common Vector Operations, using all and any function, subletting of vector. Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns, lists, creating lists, general list operations, accessing list components and values, applying functions to lists, recursive lists

Unit II

Creating Data Frames – Matrix-like operations in frames, Merging Data Frames, Applying functions to Data frames, Factors and Tables , factors and levels , Common functions used with factors , string operations

Unit III

Input/ Output: scan (), read line() Function, Printing to the Screen Reading and writing CSV and text file. Control statements: Loops, Looping Over Nonvector, Sets, if-else, writing user defined function, scope of the variable, R script file

Unit IV

Graphics in R: Graph Syntax ((title, xlabel, ylabel, pch, lty, col.), Simple graphics (Bar, Multiple Bar, Histogram, Pie, Box-Plot, Scatter plot, qqplot), Low-level and High-Level plot functions, par() command to generate multiple plots.

Note:

Practical: Based on simple mathematical problems and based on syllabus of Statistical Methods for descriptive Statistics.

References Books:

1. Andrie de Vries and Joris Meys, R Programming for Dummies, Wiley (2016), 2nd Edition.
2. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (2017), 1st Edition.
3. Sandip Rakshit, Statistics with R Programming, McGraw Hill Education (2018), 1st Edition.
4. Garrett Golemund, Hands on Programming with R, O'Reilly (2014), 1st Edition
5. Mark Gardener, Beginning R: The Statistical Programming Language, Wiley (2013)
6. Tilman M. Davies, The Book of R: A first Course in Programming and Statistics, No Strach Press (2016), 1st Edition

Master of Science (Mathematics) (FYIP)
Semester-V
Session-2026-27
Course Title: Machine Learning
Course Code: FMAL-5133

Examination Time: 3 Hours

L T P
4 0 0

Max. Marks: 100

Theory: 70

CA:30

Instructions for Paper Setters:

Eight questions of equal marks (14 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit I

Introduction: The Machine learning landscape: What is Machine Learning (ML), Why Machine Learning, Type of ML Systems, Main challenges of machine learning, Confusion Matrix, testing and validating. Applications of Machine Learning Applying Machine Learning to a project- Step through the machine learning workflow using an example. Working with real data, get data and prepare for machine learning by pre-processing data, deriving features, and training and refining models, fine tune the model, ready the solution for production. Probability and classification, Bayes optimal decisions, Naive Bayes and Gaussian class- conditional distribution.

Unit II

Linear regression; SSE; gradient descent; normal equations; features, Overfitting and underfitting. Classification problems; decision boundaries; nearest neighbour methods Supervised Learning: Linear classifiers, Bayes' Rule and Naive Bayes Model, Training a binary classifier, performance measures, multiclass classification, error analysis, multilabel classification, multioutput classification. Training Models: gradient descent, Polynomial regression, learning curves, regularized linear models, Logistic regression, Linear SVM classification, Non-linear SVM classification, SVM regression.

Unit III

Decision tree, Ensemble methods: Bagging, random forests, boosting, practical examples; the curse of dimensionality, dimensionality reduction, principal components analysis Unsupervised learning: clustering and clustering algorithms; Using clustering for image segmentation, for pre-processing, semi-supervised learning, DBSCAN; Gaussian Mixtures– anomaly detection, selecting number of clusters, Bayesian Gaussian mixture models, novelty detections algorithms.

Unit IV

Reinforcement learning and adaptive models, the model-based reinforcement learning paradigm, Explore Q-learning and SARSA.

Reference Books:

1. Alpaydin, E., Introduction to Machine Learning, Second Edition.
2. Geron, A., Hands on Machine Learning with Scikit Learn, Keras & Tensor Flow, O'Reilly
3. Marsland, S., Machine Learning: An Algorithmic Perspective
4. Bishop, C.M., Pattern Recognition and Machine Learning
5. Mitchell, T., Machine Learning 6. Raschka, S., Python Machine Learning, PACKT Publishing

Master of Science (Mathematics) (FYIP)
Semester–VI
Session: 2026-27
Course Title: Data and File Structures
Course Code: FMAL-6134

Examination Time: 3Hours

Max. Marks: 100

Theory: 70

CA: 30

L T P

4 0 0

Instructions for the Paper Setters: Eight questions of equal marks (14 Marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Unit I

Preliminaries: Various data structures, common operations on data structures, algorithm complexity, big O notation, time–space tradeoff between algorithms. Arrays: Arrays defined, representing arrays in memory, various operations on linear arrays, Multi-dimensional arrays, Records. Linked Lists: Types of linked lists, representing linked lists in memory, advantage of using linked lists over arrays, various operation on linked lists

Unit II

Stacks: Description of stack structure, implementation of stack using arrays and linked lists. Applications of stacks– converting arithmetic expression from infix notation to polish and their subsequent evaluation, quicksort technique to sort an array, parenthesis checker. Queues: Description of queue structure, implementation of queue using arrays and linked lists, description of priorities queues. Applications of queues– Operating system simulations Trees: Description of tree structure and its terminology, binary search tree, implementing binary search tree using linked lists, various operations on binary search trees, AVL Trees, Threaded Binary Trees, B Trees, B+ trees.

Unit III

Greedy Method: Knapsack Problem, Prim's and Kuruskal's Algorithm to find MSTs. Heaps: Description of heap structure, implementing heaps using arrays, various operations on heaps, Applications of heaps– heapsort technique to sort an array, implementation of priority queues. Graphs: Description of graph structure, implementing graphs in memory using adjacency matrix or adjacency lists, various graphs traversing algorithms, finding shortest path between two nodes, Dijkstra's shortest path algorithm., finding biconnected component, strongly connected component and finding cycles in the graphs.

Unit IV

Searching and Sorting: Sorting Types, External and Internal sort Linear Search, Binary search, Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Quick sort, Radix Sort. Hash Tables: Direct address tables, hash tables, collision resolution by chaining, hash functions, open addressing– linear probing, quadratic probing, double hashing. Files: Operations on files, Types of files, File Organizations: Sequential files, Indexed Sequential file, Directed files and multi–key files, File performance criteria and terms.

Reference Books:

1. Lipschutz, S., Theory and Problems of Data Structures, Schaum Outline Series, McGraw–Hill Book Company. Third Edition
2. Esakov, J., Data Structures– An Advanced Approach Using C, Tom Weiss, Prentice– Hall International, Inc. 2007
3. Trembley and Sorenson: An Introduction to Data Structures with Application, Tata–McGraw Hill Company, Delhi. 2003
4. Tanenbaum: Data Structures and C. Second Edition

Master of Science (Mathematics) (FYIP)
Semester–VII
Session-2026-27
Course Title: Machine Learning
Course Code: FMAL-7134

Examination Time: 3 Hours

L T P
4 0 0

Max. Marks: 100

Theory: 80
CA:20

Instructions for Paper Setters:

Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Unit I

Introduction: The Machine learning landscape: What is Machine Learning (ML), Why Machine Learning, Type of ML Systems, Main challenges of machine learning, Confusion Matrix, testing and validating. Applications of Machine Learning Applying Machine Learning to a project- Step through the machine learning workflow using an example. Working with real data, get data and prepare for machine learning by pre- processing data, deriving features, and training and refining models, fine tune the model, ready the solution for production. Probability and classification, Bayes optimal decisions, Naive Bayes and Gaussian class- conditional distribution.

Unit II

Linear regression; SSE; gradient descent; normal equations; features, Overfitting and underfitting. Classification problems; decision boundaries; nearest neighbour methods Supervised Learning: Linear classifiers, Bayes' Rule and Naive Bayes Model, Training a binary classifier, performance measures, multiclass classification, error analysis, multilabel classification, multioutput classification. Training Models: gradient descent, Polynomial regression, learning curves, regularized linear models, Logistic regression, Linear SVM classification, Non-linear SVM classification, SVM regression.

Unit III

Decision tree, Ensemble methods: Bagging, random forests, boosting, practical examples; the curse of dimensionality, dimensionality reduction, principal components analysis Unsupervised learning: clustering and clustering algorithms; Using clustering for image segmentation, for pre-processing, semi-supervised learning, DBSCAN; Gaussian Mixtures– anomaly detection, selecting number of clusters, Bayesian Gaussian mixture models, novelty detections algorithms.

Unit IV

Reinforcement learning and adaptive models, the model-based reinforcement learning paradigm, Explore Q-learning and SARSA.

Reference Books:

1. Alpaydin, E., Introduction to Machine Learning, Second Edition.
2. Geron, A., Hands on Machine Learning with Scikit Learn, Keras & Tensor Flow, O'Reilly
3. Marsland, S., Machine Learning: An Algorithmic Perspective
4. Bishop, C.M., Pattern Recognition and Machine Learning
5. Mitchell, T., Machine Learning 6. Raschka, S., Python Machine Learning, PACKT Publishing

Master of Science (Mathematics) (FYIP)
Semester–VIII
Session-2026-27
Course Title: Data and File Structures
Course Code: FMAL-8134

Examination Time: 3 Hours

Max. Marks: 100

Theory: 80

CA: 20

L T P

4 0 0

Instructions for the Paper Setters: Eight questions of equal marks (16 marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Unit I

Preliminaries: Various data structures, common operations on data structures, algorithm complexity, big O notation, time–space tradeoff between algorithms. Arrays: Arrays defined, representing arrays in memory, various operations on linear arrays, Multi-dimensional arrays, Records. Linked Lists: Types of linked lists, representing linked lists in memory, advantage of using linked lists over arrays, various operation on linked lists

Unit II

Stacks: Description of stack structure, implementation of stack using arrays and linked lists. Applications of stacks– converting arithmetic expression from infix notation to polish and their subsequent evaluation, quicksort technique to sort an array, parenthesis checker. Queues: Description of queue structure, implementation of queue using arrays and linked lists, description of priorities queues. Applications of queues– Operating system simulations Trees: Description of tree structure and its terminology, binary search tree, implementing binary search tree using linked lists, various operations on binary search trees, AVL Trees, Threaded Binary Trees, B Trees, B+ trees.

Unit III

Greedy Method: Knapsack Problem, Prim's and Kuruskal's Algorithm to find MSTs. Heaps: Description of heap structure, implementing heaps using arrays, various operations on heaps, Applications of heaps– heapsort technique to sort an array, implementation of priority queues. Graphs: Description of graph structure, implementing graphs in memory using adjacency matrix or adjacency lists, various graphs traversing algorithms, finding shortest path between two nodes, Dijkstra's shortest path algorithm., finding biconnected component, strongly connected component and finding cycles in the graphs.

Unit IV

Searching and Sorting: Sorting Types, External and Internal sort Linear Search, Binary search, Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Shell Sort, Quick sort, Radix Sort. Hash Tables: Direct address tables, hash tables, collision resolution by chaining, hash functions, open addressing– linear probing, quadratic probing, double hashing. Files: Operations on files, Types of files, File Organizations: Sequential files, Indexed Sequential file, Directed files and multi–key files, File performance criteria and terms.

Reference Books:

1. Lipschutz, S., Theory and Problems of Data Structures, Schaum Outline Series, McGraw–Hill Book Company. Third Edition
2. Esakov, J., Data Structures– An Advanced Approach Using C, Tom Weiss, Prentice– Hall International, Inc. 2007
3. Trembley and Sorenson: An Introduction to Data Structures with Application, Tata–McGraw Hill Company, Delhi. 2003
4. Tanenbaum: Data Structures and C. Second Edition

Bachelor of Medical Laboratory Science Semester - I
Session 2026-27
COURSE CODE: BMSM - 1130
BASICS OF COMPUTER APPLICATIONS

Course Outcomes:

On Completion of this course, the student will be able to:

CO1: Identify the basic components and functions of computer hardware and software

CO2: Comprehend the basics of Operating system and User Interface.

CO3: To work with Word documents and apply various formatting techniques, page setup, creation of tables and other functions required in day-to-day word processing tasks. To be able to make presentations, adding graphics, charts, audio, video and applying various themes and transition effects required for making an effective PowerPoint presentation.

CO4: To work with the basics of Internet and E-Mail.

Bachelor of Medical Laboratory Science Semester - I
Session 2026-27
COURSE CODE: BMSM - 1130
BASICS OF COMPUTER APPLICATIONS

Examination Time: (3+3) Hours
L-T-P: 2-0-1
Credit: 3

Max. Marks: 50
Theory: 20
Practical: 15
CA: 15

Instructions for Paper Setter -

- Eight questions of equal marks (4 marks each) are to be set, two in each of the four Sections (A-D).
- Questions of Sections A-D should be set from Units I-IV of the syllabus respectively.
- Questions may be subdivided into parts (not exceeding four).
- Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT I

Introduction to Computers: Generations of computers, Applications of computers, Parts of a Computer, I/O devices, computer uses in healthcare

UNIT II

Basics of Operating System: Introduction to OS, Features of Windows OS, File management, User interface basics.

UNIT III

Microsoft Word and PowerPoint: Introduction to Word, Typing medical documents, formatting, tables, inserting images, Introduction to PowerPoint, slide creation. Microsoft Excel, Access: Introduction to Excel and Access, Entering data, basic formulas, formatting cells, simple charts.

UNIT IV

Internet & Email: Definition, types of network, using browsers, opening email, attaching reports, basic internet safety.

Computers in Healthcare: Electronic health record, Hospital Information System basics, digital patient records, lab reporting usage

References / Textbooks:

1. Sinha P.K., "Computer Fundamentals", BPB Publications
2. Norton Peter, "Introduction to Computers", McGraw Hill Education
3. Rajaraman V (Author), Adabala N, "Fundamentals of Computers", Prentice Hall India Learning Private Limited
4. V. Rajaramana, Computer basics and programming, PHI Learning Pvt. Ltd.
5. Michael Miller, Computer Basics and Absolute Beginner's Guide, Que Publishing

Master of Business Administration Semester I
Session: 2026-27
AUTOMATED SPREADSHEET MANAGEMENT
Course Code: MBAM- 1126

Time: 3 Hours

L-T-P
2-0-2

Max. Marks: 100
Theory Marks: 40
Practical Marks: 30
CA: 30

Instructions for the Paper Setter:

Eight questions of equal marks (8 Marks) are to be set, two in each of the four sections (A-D). Questions of sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be sub divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

Unit-I

Creating Worksheet/Spreadsheets: Navigate in Worksheets and Workbooks, Customise Options and Views for Worksheets and Workbooks, Computations in a Worksheet, Printing the Worksheet, Creating of Tables and Graphs, Filter and Sort a Table, Auditing Worksheets, Apply Advanced Conditional Formatting.

Unit-II

Analyzing Data using Pivot Tables: Creating, formatting and modifying a pivot table, sorting, filtering and grouping items, creating calculated field and calculated item, creating pivot table charts, producing a report with pivot tables.

Charts and slicers, Various Charts i.e. Bar Charts / Pie Charts / Line Charts, Using SLICERS, Filter data with Slicers

Analyzing and Organizing Data: Creating Scenarios, creating a Scenario Report, Working with Data Tables.

Unit-III

Summaries Data by using Functions and Formulas: Logical operations by using the IF, SUMIF and AVERAGEIF functions, Perform statistical operations by using the COUNTIF function, Format and Modify Text by using Functions, Apply Advanced Date and Time Functions, Troubleshoot Formulas, Look up data by using Functions, Math & Trig Functions, Statistical Functions, Text Functions, Logical Functions.

Data Validation: Number Date and Time Validation, Text and List Validation, Custom Validations based on formulae for cell.

Unit-IV

Hyper Linking Data: within Sheet / Workbook Linking & Updating links between workbooks & application.

AI Based Learning: AI-Powered Data Visualization in Excel, Automated Data Cleaning with AI, AI-Powered Pivot Tables, Smart Formula Suggestions Using AI, Real-World Applications of AI in Business Analytics with Excel

Suggested Readings:

1. McFedries. Paul, Microsoft Excel Formulas and Functions (Office 2021 and Microsoft 365), **Pearson Education India.**
2. Singh Hardeep, Sharma Anshuman, Fundamentals of Information Technology, **Lakhanpal Publishers**
3. Excel with Microsoft Excel: Comprehensive & Easy Guide to Learn Advanced MS Excel by **Naveen Mishra, Penman Books**
4. "Artificial Intelligence Fundamentals for Business Leaders" by **I Almeida, AI Academy**

Note: Latest edition of books to be used.

MASTER OF ARTS (ENGLISH) (FYIP) SEMESTER–III

Session 2026-27

Course Code: FENM-3127

COMPUTER SKILLS

Examination Time: 3 Hours

Max. Marks: 100

L-T-P: 2-0-2

Theory: 40

Credit: 4

Practical: 30

CA: 30

Instructions for the Paper Setter:

Eight questions of equal marks (08 marks each) to be set, two from each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Word Processing:

- Creating and managing Word documents
- Shortcuts for navigation, insertion, deletion, and selection
- Formatting fonts with bolding, bullets and numbers
- Creative use of cut, copy and paste
- Format painter
- Page numbering
- Borders and shading
- Bookmarks

UNIT-II

- Tables
- Graphics, Smart Art, watermarks, hyperlinks, print screen function
- Word art
- Shortcut features like AutoCorrect, quick sections
- Find and replace
- Insert pictures, Headers, Footers
- Page breaks, drop caps
- Spelling, grammar, thesaurus
- Print and Save

UNIT-III

Presentations:

- Slide content: planning, opening slides, sequencing
- Bullet/number slides (variations, sequencing, layout)
- Graphics, shapes (alternatives to bullets; use color to influence mood; use images to reinforce messages)
- Smart art (effective use of diagrams)
- Photos and internet photos (formatting options)
- Copy/paste shortcuts (from other programs; linking)
- Create/import org charts, graphs and tables

UNIT-IV

- Hyperlinks to others programs and the internet
- Insert media clips, movies, sounds
- Views: Slide sorter, Outline, notes as editing and presentation tools
- Presenting: transitions, animation, hiding slides, pausing and highlighting
- Automatic presentations (narrations, timing)
- Presentation methods to connect with individuals and groups

References:

9. Anshuman Sharma, A book of Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
10. Prof. Satish Jain, M. Geetha, Kratika, BPB's Office 2010 Course Complete Book, BPB Publications, 2017.
11. Joyce Cox, Joan Lambert and Curtis Frye, Microsoft office Professional 2010 Step by Step, Microsoft Press, 2010.
12. P.K. Sinha, Computer Fundamentals, BPB Publications, 2004.
13. Ebooks at OpenOffice.org
14. R. Gabriel Gurley, A Conceptual Guide to OpenOffice.org3, 2nd Edition.

Note: The latest editions of the books should be followed.

Master of Business Administration
Two-Year Degree Programme
(Credit Based Continuous Evaluation Grading System)
Session: 2026-27
Semester-IV
ARTIFICIAL INTELLIGENCE IN BUSINESS
Course Code: MBAL-4111

Course outcomes:

After the successful completion of this course, students will be able to:

- CO1:** explain the evolution of industrial revolutions and analyze the role of data in emerging technologies.
- CO2:** apply concepts of data science, including the data value chain and Big Data, to managerial decision-making.
- CO3:** demonstrate understanding of core technologies such as AI, IoT, and AR/VR, and evaluate their applications and limitations.
- CO4:** assess ethical, professional, and societal implications of advanced technologies including Blockchain, Cloud, Quantum computing, and Cybersecurity.

Master of Business Administration
Two-Year Degree Programme
(Credit Based Continuous Evaluation Grading System)
Session: 2026-27
Semester-IV
ARTIFICIAL INTELLIGENCE IN BUSINESS
Course Code: MBAL-4111

Time: 3 Hours
L-T-P
4-0-0

Max.Marks:100
Theory:70
CA:30

Instructions for the Paper–Setter:

Eight Questions of equal marks are to be set (14 marks each), two in each of the four sections (A-D). Questions of section A-D should be set from units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one from each section. The fifth question may be attempted from any section.

Unit-I

Artificial Intelligence (AI): Concepts, history, goals, levels, types, techniques, applications (agriculture, health, business, education), tools/platforms, advantages & limitations

Emerging Technologies: Evolution of technologies and industrial revolutions (IR 1.0 to IR 4.0), Role of data in emerging technologies, Enabling devices and networks (programmable devices), Human–machine interaction, Future trends in technology

Unit II

Data Science for Management: Definition of data and information, Data processing cycle, types, and representation, Data Value Chain: acquisition, analysis, curating, storage, usage, Basics of Big Data and its role in decision-making

Unit III

Internet of Things (IoT): Meaning, history, advantages, challenges, architecture, devices/networks, applications (smart home, smart grid, smart city, wearables, smart farming), tools/platforms

Augmented Reality (AR) & Virtual Reality (VR): Concepts, AR vs. MR, architecture, applications (education, medical, assistance, entertainment)

Unit IV

Ethics, Professionalism & Other Technologies: Technology and ethics: digital privacy, accountability, trust, Threats and challenges in emerging technologies, Other technologies: Blockchain, Cloud computing, Quantum computing, Autonomic computing, Computer vision, Cyber security, Additive manufacturing (3D printing)

Suggested Readings:

1. Introduction to Artificial Intelligence and Machine Learning (1st ed.), Rainer, R. K., Wiley, 2025.
2. Emerging Technologies for Emerging Markets: Vong, J., & Song, I., Springer Singapore, 2014.
3. Disruption: Emerging Technologies and the Future of Work, Del Rosal, V., Emtechub, 2015.
4. Emerging Internet-Based Technologies: Sadiku, M. N. O, CRC Press, 2019.
5. Emerging Exponential Technologies – A Management Perspective: Dr. D.G. Kulkarni and Dr. Prayag Gokhale, Himalaya Publishing House Pvt. Ltd., 1/e, 2020.

Master of Business Administration
Two-Year Degree Programme
(Credit Based Continuous Evaluation Grading System)
Session: 2026-27
Semester-IV
GROUP B- MARKETING
DIGITAL AND SOCIAL MEDIA MARKETING
Course Code: MBAL- 4123
(Opt. BIII)

Course outcomes:

After the successful completion of this course, students will be able to:

CO1: Explain digital marketing concepts and consumer behavior.

CO2: Design social media strategies using major platforms and influencers.

CO3: Develop campaigns, apply advertising techniques, and manage governance.

CO4: Use AI tools for analytics, personalization, and automation in marketing.

Master of Business Administration
Two-Year Degree Programme
(Credit Based Continuous Evaluation Grading System)
Session: 2026-27
Semester-IV
Group B- Marketing
DIGITAL AND SOCIAL MEDIA MARKETING
Course Code: MBAL-4323
(Opt. BIII)

Time: 3 Hours
Max.Marks:10
Theory: 70
CA: 30

L-T-P
4-0-0

Instructions for the Paper–Setter:

Eight Questions of equal marks are to be set (14 marks each), two in each of the four sections (A-D). Questions of section A-D should be set from units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one from each section. The fifth question may be attempted from any section.

Unit-I

Foundations of Digital Marketing: Evolution and scope of digital marketing, Online consumer behaviour and digital customer journey, Search Engine Optimization (SEO) and Search Engine Marketing (SEM), Website design, usability, and analytics basics, integration of digital marketing with traditional marketing.

Unit-II

Social Media Ecosystem & Strategies: Introduction to Social Media Marketing (SMM), Major platforms: Facebook, YouTube, LinkedIn, Google, Foursquare, Instagram, Twitter, Social Media Marketing Strategies across platforms, Content creation, storytelling, and community building, Role and types of influencers (Expert, Referent, etc.).

Unit-III

Campaigns, Advertising & Governance: Social Media Marketing Campaigns: types, process, rules of the market, Developing SMM voice: need, characteristics, ownership, Social Advertising: appeals, gaining attention on networks, Social Media Governance: models, impact on company functions, crisis management.

Unit-IV

AI Integration & Emerging Trends: Predictive Analytics in digital and social media marketing, AI-driven content creation and optimization, Personalization and automation in campaigns, Emerging trends: AR/VR, chatbots, metaverse marketing, Ethical issues: privacy, data protection, responsible advertising.

Case Studies for Reference

1. **Netflix: AI-Driven Personalization and Customer Engagement:** AI in content recommendations, consumer analytics, customer retention, and global digital marketing.
2. **Nike: Digital Branding and Community Building:** Social media storytelling, influencer marketing, customer engagement, and brand advocacy.
3. **Starbucks: Digital Customer Experience Strategy:** Mobile marketing, customer loyalty programs, social media engagement, and personalization

Suggested Readings

1. Tuten, T. L., & Solomon, M. R. *Social Media Marketing*. Sage Publications.
2. Chaffey, D., & Ellis-Chadwick, F. *Digital Marketing*. Pearson Education.
3. Patnaik, R., & Mahapatra, D. M. (2025). *Digital and Social Media Marketing: Theory and Practices*. Sultan Chand & Sons.
4. Ryan, D. *Understanding Digital Marketing*. Kogan Page.
5. Sterne, J. *Artificial Intelligence for Marketing*. Wiley.
6. Evans, D. *Social Media Marketing*. Wiley.

Note: Latest editions of the books should be followed.