

**Proposed BCA Syllabus as per Grading
and Credit System according to National
Education Policy - 2020**

National Education Policy-2020
Common Minimum Syllabus for University and Colleges

BACHELOR OF COMPUTER APPLICATION

BCA

(Session 2022-2023 Onwards)

As per Syllabus Development Guidelines

[Three Years Degree Course in Computer Applications]

(PROPOSED BCA SYLLABUS)

**PROF. RAJENDRA SINGH (RAJJU BHAIYA) UNIVERSITY,
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Semester wise titles of Courses/Papers of BCA as per NEP 2020 (Credits and Grading System)

Semester	Courses/ Papers	Courses Code	COURSE TITLE	Theory/ Practical	Credits	Evaluation (MM-100)	
						CIE	ETE
BCA-I Sem	I	B230101T	MATHEMATICS	T	4	25	75
	II	B230102T	COMPUTER FUNDAMENTALS	T	4	25	75
	III	B230103T	PRINCIPLES OF PROGRAMMING USING 'C'	T	4	25	75
	IV	B230104T	DIGITALELECTRONICS	T	4	25	75
	V	B230105T	COMMUNICATION SKILLS	T	4	25	75
	VI	B230106P	C PROGRAMMING LAB. DIGITAL ELECTRONICSLAB.	P	5	25	75
BCA-II Sem	I	B230201T	STATISTICS	T	4	25	75
	II	B230202T	PROGRAMMING IN 'C'	T	4	25	75
	III	B230203T	SYSTEM ANALYSIS AND DESIGN	T	4	25	75
	IV	B230204T	COMPUTER ORGANIZATION	T	4	25	75
	V	B230205T	DATA BASE MANAGEMENT SYSTEM	T	4	25	75
	VI	B230206P	DBMS LAB. C PROGRAMMING LAB.	P	5	25	75
BCA-III Sem	I	B230301T	DISCRETE MATHEMATICS	T	4	25	75
	II	B230302T	DATA AND FILE STRUCTURE	T	4	25	75
	III	B230303T	COMPUTER GRAPHICS AND MULTIMEDIA	T	4	25	75
	IV	B230304T	OPERATING SYSTEM	T	4	25	75
	V	B230305T	OBJECT ORIENTED METHODOLOGY USING C++	T	4	25	75
	VI	B230306P	COMPUTER GRAPHICS LAB. DATA AND FILE STRUCTURE LAB. C++ PROGRAMMING LAB.	P	5	25	75
BCA-IV Sem	I	B230401T	NUMERICAL METHODS	T	4	25	75
	II	B230402T	JAVA PROGRAMMING	T	4	25	75
	III	B230403T	DOT NET AND C# PROGRAMMING	T	4	25	75
	IV	B230404T	CYBER LAW AND INTERNET SECURITY	T	4	25	75
	V	B230405T	SOFTWARE ENGINEERING	T	4	25	75
	VI	B230406P	DOT NET AND C# PROGRAMMING LAB. JAVA PROGRAMMING LAB.	P	5	25	75
BCA-V Sem	I	B230501T	DESIGN AND ANALYSIS OF ALGORITHMS	T	4	25	75
	II	B230502T	INTRODUCTION TO PYTHON	T	4	25	75
	III	B230503T	DATA COMMUNICATION AND NETWORKS	T	4	25	75
	IV	B230504T	INTERNET AND WEB DESIGN	T	4	25	75
	V	B230505P	WEB PROGRAMMING LAB.	P	4	25	75
	VI	B230506R	MINOR PROJECT	R	5	25	75

BCA-VISem	ELECTIVE (Choose AnyTwo Papers)	I	B230601T	E COMMERCE AND APPLICATION	T	4	25	75
		II	B230602T	ADVANCED DATA BASE MANAGEMENT SYSTEM	T	4	25	75
		III	B230603T	ADVANCED COMPUTER ARCHITECTURE	T	4	25	75
		IV	B230604T	NETWROK MANAGEMENT AND SECURITY	T	4	25	75
		V	B230605T	OPTIMIZATION TECHNIQUES	T	4	25	75
		VI	B230606T	IMAGE PROCESSING	T	4	25	75
	VII	B230607R	MAJOR PROJECT	R	16	25	75	

Note: Continuous Internal Evaluation (CIE) will be three time as Test-I, Test-II and Test-III as per scheduledecided by University and Best of Two test marks will be included in final marks. Each test will be of 12.50marks.

Thereis:

CIE:ContinuousInternalEvaluation

ETE:End-TermExamination(UniversityExamination)

SEMESTER-I

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	VI	B230106P	C PROGRAMMING LAB. DIGITAL ELECTRONICS LAB.	P	5	25	75

Mathematics

Trigonometry and Complex Numbers:

Trigonometry: Trigonometry Functions, Functions of angles of any magnitude, Compound and multiple angles, Inverse circular functions. Complex Numbers: Modules, Argument of complex number, Polar form, vector form, Complex conjugate, Algebraic operations, De-Moivre's theorem, Roots of a complex number.

Matrices and Determinants:

Definition of different types of matrix. Algebraic operations, Symmetric & skew symmetric matrix, Transpose of matrix, Orthogonal matrices, Rank of matrix, Determinant of a square matrix, Inverse of a square matrix, Solution of Linear Equations by Cramer's rule and Gauss-Elimination method, Eigen values & Eigen vectors of a square matrix.

Differential Calculus:

Limit, Continuity and differentiability of functions, Differentiation Rules, Differentiation of functions (Algebraic, Trigonometric, Logarithmic, Exponential and inverse trigonometric functions), Tangent and normal lines, Condition of tangency, Extreme values of functions.

Integral Calculus:

Indefinite integrals, Basic formulae. Integration by parts, Integration by substitution, Definite integrals. Properties of definite integrals, Evaluation of double integration & triple integration, Application of definite integral to find Area and Volume.

Vector Calculus:

Vectors in a plane, Linear dependence and independence of vectors. Vectors in space, Dot and cross-product of vectors, Gradient of vectors, Divergence of vectors, curl of vectors, Physical interpretation of gradient, Divergence and curl of vectors.

Referential Books :

1. Advanced Engineering Mathematics- Erwin Kreyszig
2. Calculus: Volume I-Apostol
3. Elementary Engineering Mathematics, B S Grewal
4. Higher Engineering Mathematics, B S Grewal

Computer Fundamentals

Introduction:

Characteristics of Computers, Block diagram of computer. Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers. Types of Programming Languages (Machine Languages, Assembly Languages, High Level languages). Data Organization, Drives, Files, Directories. Types of Memory (Primary and Secondary) RAM, ROM, PROM, EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive) UO Devices (Scanners, Plotters, LCD, Plasma Display). Number Systems Introduction to Binary, Octal, Hexadecimal system Conversion, Simple Addition, Subtraction, Multiplication.

Algorithm and Flowcharts Algorithm:

Definition, Characteristics, Advantages and disadvantages, Examples Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples.

Operating System and Services in O.S.:

Dos- History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S. Windows Operating Environment Features of MS- Windows. Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.

Editors and Word Processors:

Basic Concepts, Examples: MS-Word. Introduction to desktop publishing Spreadsheets and Database packages Purpose, usage. Command, MS-Excel, Creation of tiles in MS-Access, Switching between application, MS-PowerPoint.

Referential Books :

1. Fundamental of Computers — By V.Rajaraman B.P B. Publications
2. Fundamental of Computers — By P.K. Sinha
3. MS-Office 2000(For Windows) — By Steve Sagman

Principles of Programming Using C**Introduction:**

History, Structures of 'C' Programming, Function as building blocks. Language Fundamentals Character set. C Tokens, Keywords, Identifiers, Variables, Constant, Data Types, Comments.

Operators:

Types of operators, Precedence and Associativity, Expression, Statement and types of statements Build in Operators and function Console based I/O and related built in I/O function: printf(), scanf(), getch(), getchar(), putchar(), Concept of header files, Preprocessor directives: #include, #define.

Control structures:

Decision making structures: If, If-else, Nested If-else, Switch; loop Control structures: While, Do-while, for, Nested for loop, other statements: break, continue, goto, exit.

Simple Arithmetic Problems:

Addition / Multiplication of integers, Determining if a number is +ve / -ve / even / odd, Maximum of 2 numbers, 3 numbers, Sum of first n numbers, given n numbers, Integer division, Digit reversing, Table generation for n, Factorial, sine series, cosine series. Pascal Triangle, Prime number, Factors of a number, other problems such as Perfect number, GCD numbers, swapping, etc.

Functions: Basic types of function, Declaration and definition, Function call, Types of function, Parameter passing, Call by value, Call by reference, Scope of variable, Storage classes, Recursion.

Referential Books :

1. Programming in C-Balguruswamy
2. The C programming Language, Pearson Education - Dennis Ritchie
3. Structured programming approach using C- Forouzan&Ceilber, Thomson learning publication

Digital Electronics**Number system and Logic Gates:**

Introduction of number systems, Radix, Radix Interconversion, Radix Complement, Diminished radix complement. Basic theorem of Boolean algebra. Boolean function and minimization, Karnaugh map. Combinational circuits and their analysis. Universal Gates, Realization of Primary gates using Universal gates only.

Combinational logic circuits:

Binary adder and Subtractor circuits, Magnitude comparator, Decoders, Encoders, Multiplexer and demultiplexer, Realization of switching expressions by decoders, encoders, multiplexer and Demultiplexer, Programmable logic circuits, Tri-state logic, Memory Elements.

Sequential Logic Circuits:

Sequential circuits, latches and Flip Flops. Analysis of clocked sequential circuits. State reduction and assignment, design of synchronous circuits, shift registers, ripple counters. synchronous counters.

Digital Integrated Circuits:

Characteristics of digital ICs, Introduction to logic families- RTL, DTL. TTL, ECL. MOS and CMOS circuits and comparison.

Referential Books:

1. Digital Design: M.Morris Mano (PHI)
2. Digital circuits & logic design: S.C.Lee (PHI)
3. Digital electronics: W.H.Gothmann (PHI)
4. Switching theory: A.K Gautam (Katsons)

Communication Skills**Introduction to Communication:**

Means of Communication: Meaning and Definition- Process Functions - Objectives - Importance
- Essentials of good communication - Communication barriers, 7C's of Communication.

Types of Communication:

Oral Communication: Meaning, nature and scope — Principle of effective oral communication — Techniques of effective speech — Media of oral communication (Face-to-face conversation — Teleconferences - Press Conference — Demonstration — Radio Recording — Dictaphone — Meetings — Rumor — Demonstration and Dramatization — Public address system — Grapevine — Group Discussion — Oral report — Closed circuit TV). The art of listening — Principles of good listening.

Written Communication: Purpose of writing, Clarity in Writing, Principle of Effective writing, Writing Techniques, Electronic Writing Process. Business Letters & Reports: Need and functions of business letters — Planning & layout of business letter Kinds of business letters Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports. Drafting of business letters: Enquiries and replies — Placing and fulfilling orders Complaints and follow-up Sales letters — Circular letters Application for employment and resume.

Information Technology for Communication:

Word Processor — Telex — Facsimile(Fax) — E-mail — Voice mail — Internet — Multimedia Teleconferencing — Mobile Phone Conversation — Video Conferencing — SMS — Telephone Answering Machine — Advantages and limitations of these types. Topics Prescribed for workshop/skill lab Group Discussion, Mock Interview, Decision Making in a Group

Referential Books:

Essentials of Business Communication, Rajendra Pal & J S Korlahalli
Business Communication, Gyani
Developing Communication Skills, Krishna Mohan and MeeraBanerji
Business Correspondence and Report Writing. R C Sharma and Krishna Mohan
Communication Skill, R Datta Roy and K KDhir

SEMESTER-II

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	V	B230205T	DATA BASE MANAGEMENT SYSTEM	T	4	25	75
	VI	B230206P	DBMS LAB. C PROGRAMMING LAB.	P	5	25	75

Statistics

Population, Sample and Data Condensation:

Definition and scope of statistics, concept of population and sample with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.

Measures of Central Tendency:

Concept of central Tendency.requirements of good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.

Measures of Dispersion:

Concept of dispersion, Absolute and relative measure of dispersion, range variance.Standard deviation, Coefficient of variation.Permutations and Combinations.

Sample space, Events and Probability:

Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event: Simple examples. Classical definition of probability, Definition of conditional probability.Definition of independence of two events, simple numerical problems.

Referential Books:

1. S.C.Gupta - Fundamentals of statistics - Sultan chand& sons, Delhi.
2. D.N.Elhance - Fundamentals of statistics - KitabMahal, Allahabad.
3. Montgomery D.C. — Statistical Quality Control - John Welly and Sons
4. Goon, Gupta And Dasgupta - Fundamentals of statistics - The world press private ltd Kolkata

Programming in C

UNIT- I

Arrays and Functions: Introduction (One and multi-dimensional), Declaration of arrays, Initialization of arrays, processing with arrays. String manipulation, declaration of string arrays, string operations. Functions: Introduction, advantages of functions, Function definition, function call, Actual and formal arguments, local and global variables, function prototypes, types of functions, recursive functions, arrays and functions.

UNIT- II

Searching and Sorting:selection sort, bubble sort, insertion sort, quick sort, merge sortSearching: linear and binary search methods, comparison of sorting and searching methods.

UNIT- III

Structures and Pointers: Introduction to structures, Advantages of structures, accessing elements of a structure, nested structures, array of structures, functions and structures, Pointers: Introduction, pointer variable, pointer operator, pointer arithmetic, pointers and arrays, pointers and strings, array pointers, dynamic allocation.

UNIT- IV

Files, Preprocessor, standard library and header files: Files: Introduction, File data type, opening and closing a file, file functions (getc, putc, getw, putw, fscanf, fprintf, fread, fwrite, fgets, fputs, feof). Preprocessor: #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions

Referential Books:

1. Let us C-YashwantKanetkar.
2. Programming inC-Balguruswamy
3. The C programming Lang., Pearson Ecl - DennisRitchie
4. Structured programming approach using C- Forouzah&Ceilber Thomson learningpublication.
5. Pointers in C – YashwantKanetkar

System Analysis and Design

Unit 1: Basic Concept of Systems

The System: Definition and Concepts; Elements of a System: Input, Output Processor, Control, Feedback, Environment, Boundaries and Interface; Characteristics of a System; Types of systems -Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories. Information System and System Analyst- Information systems : TPS, OAS, MIS, DSS, ESS; System Analyst: Role and need of system analyst.

Unit 2: System Development Life Cycle

Introduction to SDLC, Various phases: study, analysis, design, development, testing, implementation, maintenance; System documentation: Types of documentation and their importance.

Unit 3: System Planning and Information Gathering

Initial Investigations, Identification of user needs, Project Identification and Selection; Needs of Information Gathering, Determination of requirements, Information gathering tools: interviews, group communication, questionnaires, presentations and site visits. Feasibility Study- Definition, Importance of feasibility study, Types of feasibility study, System selection plan and proposal, Prototyping, Cost-Benefit Analysis: Tools and Techniques.

Unit 4: Tools for System Analysis

Data Flow Diagram (DFD), Logical and Physical DFDs, Developing DFD; System Flowcharts and Structured charts, Structured English, Decision trees and Decision tables. System Design- Modules, Top-down and bottom-up design; Logical and Physical design, Structured design.

Unit 5: System Implementation and Maintenance

Need of System Testing, Types of System Testing, Maintenance activities and issues. System Security and Audit- System Security, Security Threats, Risk Analysis, Control measures, System Audit, Disaster Recovery Planning

Referential Books :

1. Elias m. Awad: System Analysis and Design
2. Perry Edwards: System Analysis & design McGraw Hill
3. Analysis & Design Of Information System, V Raja Raman, Prentice Hall India Learning.

Computer Organization

Basic building blocks of digital computer- Essential & non-essential components; Types of storage elements- Static memory, Dynamic Memory, EDORAM, SDRAM, NVRAM, DDRAM etc.

Basic model of stored program computer, Organization of CPU. Instruction sets: Reduced, Complex. Addressing schemes, Instruction execution mechanism.

Memory organization RAM, ROM, Memory hierarchy, Cache memory & its organization. Concept

I/O devices with special reference to modern peripheral devices, Data transfer schemes: Hand shaking, Polling, DMA.

Microprocessor: Basics, block diagrams, components of a microprocessor. Architecture , Instruction set, addressing modus of 8085. Simple assembly language programming.

Referential Books :

1. Digital Design: M.Morris Mano (PHI)
2. Digital circuits & logic design: S.C.Lee(PHI)

3. Digital electronics (circuits, systems & ICs): S.N.Ali (Galgotiapub.)
4. Digital electronics: W.H.Gothmann(PHI)
5. Switching theory- A.K Gautam(Kitsons)

Data Base Management System

Introduction:

Data, information and knowledge, Characteristics of database approach, Data independence, Architecture of database system, Data dictionary, Types of database language, database system life cycle, Overview of hierarchical, network and relational model.

Relations and Codd's rules, Concepts of keys, Relation Algebra - Select, Project, Joins, Set operations, Update operations — tuple relational calculus, Relational Calculus vs. relational algebra.

Data definition, data manipulation, view definition, nested queries, updation, Embedded SQL, Handling of nulls and cursors.

Data Models:

Conceptual, Logical and Physical design, ER models, ER diagrams, Strong and weak entity sets. Generalization. Specialization and Aggregation, Conversion of ER model into relational schemas

Normalization:

Normalization concepts, Functional dependencies and dependency preservation, Normal forms 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DKNF, Indexing, file organization, De-normalization, Clustering of tables and indexes.

Transaction Handling:

Transaction recovery, System recovery, two phase commit. concurrency problems, locking, deadlocks, security, discretionary and mandatory access control, data encryption

Distributed databases:

Overview of query processing, concurrency control and recovery in distributed databases, overview of client/server architecture and its relationship with distributed databases, performance benchmark and performance tuning of databases.

Referential Books:

1. Introduction to Database System - C.J.Date
2. Database Systems — Mcfadden et.al.
3. Database Concepts — Navathe et.al.
4. Database Structured Techniques for Design Performance — S.Atre

SEMESTER-III

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Discrete Mathematics

Mathematical Logic:

Statements, Connectives, Statement formulas, Truth functional rules, Interpretation of formulas, Tautologies, Equivalence, Functionally complete set of connectives, Normal forms, Inference, Theory of statement calculus, Consistency of premises.

Predicates, statement functions, Quantification, Interpretation of predicate formulas, Inference theory for predicate calculus, Informal & formal proofs.

Set Theory:

Relations Relation matrix. Transitive closures, Partitions and equivalence relations, Characteristic functions of a set, Principle of inclusion and exclusion, its applications

Directed Graphs:

Definition Simple digraphs, Matrix representations, Paths, Distances, Connectedness of digraphs, Path and reachability matrices, Boolean sum and product of bit matrices, Warshall's algorithm for transitive closure of relations

Referential Books:

1. Discrete Mathematical Structures with Application to computer Science- Tremblay & Manohar
2. Discrete Mathematical Structures- Preparata and Yeh

Data and File Structure

Introduction:

Data Abstraction and Algorithm, Analysis, Data types / objects / structures, Abstract definition of data structures, Representation and implementation, Time requirements of algorithms. Space requirements of algorithms.

Array:

Representation of single and multidimensional arrays; Sparse arrays — lower and upper triangular matrices and Tridiagonal matrices with Vector Representation

Stacks, Queues and Linked list:

Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

Linked List: Introduction, Singly linked lists, list heads, circular linked list, doubly linked lists, operations on linked list such as traversal, insertion, deletion. Searching, Applications of Linked list.

Trees and Graph:

Tree: Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree, AVL tree.

Graphs: Definition, terminologies and properties, Graph representations, Minimum spanning trees, Depth-first search, Breadth-first search.

Sorting, Starching and Hashing:

Internal and External Sorting algorithms, Heap sort, Merge sort, Quick-sort, General radix sort, Sequential search and Binary search. Hashing: Hash functions, Collision resolution technique

Referential Books:

1. Data Structures and Program Design- Robert Kruse.
2. Data Structures- Horowitz and Sahni
3. Data Structures through C- A. Tannenbaum

Computer Graphics and Multimedia

Introduction:

The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Hardware and software for Computer Graphics, Conceptual Framework for interactive Graphics, Overview, Scan: Converting Lines, Converting Circles, Converting Ellipses

Display Technologies:

Raster-Scan Display System, Video Controller, Random-Scan Display Processor, Input Devices for Operator Interaction, Image Scanners, Working Exposure on Graphics Tools like Dream Weaver, 3D Effects. Clipping: Sutherland- Cohen Algorithm, Cyrus-Beck Algorithm, and Midpoint Subdivision Algorithm.

Geometrical Transformation:

2-D Transformation, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations. Window-to Viewport Transformations.

Curves and Surfaces:

Parametric and non-parametric curves and their representations, Cubic splines, Bezier and B-splines, Parametric surfaces, Surfaces of revolution, Sweep surfaces. Quadric surfaces, Bilinear surfaces, B-spline and Bezier surfaces, Generalized cylinders and cones, Polygon mesh and wire-frames.

Multimedia:

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work, Convergence of Computer, Communication and Entertainment products. Multimedia hardware, Memory & storage devices. Communication devices, Multimedia software's, presentation tools, Tools for object generations, Video, Sound, Image capturing, Authoring tools, Card and page based authoring tools. Multimedia Building Blocks- Text, Sound MIDI, Digital Audio, Audio file formats, MIDI under windows environment, Audio & Video Capture.

Referential Books:

1. Computer Graphics: Hern and Baker
2. Procedural elements in Computer Graphics: David F. Rogers
3. Mathematical Elements for Computer Graphics: David F. Rogers and I. A. Adams
4. Multimedia: Computing, Communications & Applications—Nahrstedt & Steinmetz.
5. Computer Speech Processing- Fallside F.
6. Speech Analysis, Synthesis & Perception - Flanagan, J.L. Hypertext & Hypermedia Nielsen J.

Operating System

Introduction:

Definition and types of Operating systems, Batch Systems, Multiprogramming, Time Sharing, Parallel, Distributed and Real-Time Systems, Operating System Structure. Operating System components and Services, System Calls, System Programs. Virtual Machines.

Process Management:

Process Concept, Process Scheduling, Cooperating Processes, Threads. Inter process Communication, CPU Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling and Algorithm evaluation.

Process Synchronization And Deadlocks:

The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Deadlocks-System Model, characterization, Deadlock

Prevention, Avoidance and Detection, Recovery from Deadlock, Combined approach to Deadlock Handling.

Memory Management:

Logical and Physical Address Space. Swapping, Contiguous Allocation, Paging, Segmentation with Paging, Virtual Memory, Demand Paging and its performance, Page Replacement Algorithms, Allocation of Frames. Thrashing, Page Size and other considerations. Demand Segmentation.

File Management and Security:

File Systems, Secondary Storage Structure, File concept. Access methods, Directory implementation, Efficiency and performance, Recovery,
Security: Safeguards, Penetration, Access and information flow control, Protection problems, Formal models of protection.

Referential Books:

1. Introduction of Operating Systems: Deitel
2. Operating System Concepts: Peterson and Silbershatz
3. Modern Operating Systems: Andrew S Tanenbaum

Object Oriented Methodology using C++

Introduction:

Introducing Object — Oriented Approach, Relating to other paradigms {Functional, Data decomposition }. Basic terms and ideas Abstraction, Encapsulation. Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators.

Classes and Objects:

Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity und behavior of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, Metaclass / abstract c lasses.

Inheritance and Polymorphism:

Inheritance, Class hierarchy, derivation — public.private& protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric Polymorphism. Generic function Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance.

Files and Exception Handling

Streams and files, Namespaces, Exception handling, Generic Classes

Referential Books:

1. Object-Oriented Modeling and Design- Rumbaugh etal.
2. Object Oriented Design-Booch
3. Object Oriented Programming in C++ -Lafore

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Numerical Methods

Floating point representation of numbers, Errors in numerical computations, sources of errors, significant digits.

Roots of Non-linear Algebraic and Transcendental Functions .Bisection.regula-falsi. secant and Newton-Raphson Methods ; fixed points iteration, Rate of convergence.

Numerical solution of system of linear equation, Gauss elimination method, ill-conditioned systems, Gauss-side and Jacobi methods, Rate of convergence.

Polynomial interpolation: Finite differences, Newton's forward and backward differences interpolation polynomials, Lagrange's interpolation polynomial.

Numerical differentiation and integration, Formulae for derivatives in the case of equally spaced points, Trapezoidal and Simpson rules, Errors in integration formulae

Single-step and multistep methods for solving ordinary differential equations: Taylor series method, Euler's method, Modified Euler's method, Runge-kutta methods,

Referential Books:

1. Numerical Methods for Science and Engg.-Ralph G. Stanton Prentice-Hall of India
2. Elementary Numerical Analysis An algorithmic approach.S.D Conte and Carl de Boor

Java Programming:

Basics:

Comparison of C++ and JAVA, JAVA and Internet, JAVA support systems, JAVA environment, JAVA program structure, Tokens, Statements, JVM, Constant and Variables, Data Types, Declaration of variables, Scope of variables, Symbolic constants, Type Casting Operators: Arithmetic, Relational, Logical assignments. Increment and Decrement.Conditional, Bitwise, Special, Expressions and its evaluation.

Classes and Inheritance:

Defining a Class, Adding variables and Methods to classes, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control.

Array, Interface and Exception Handling:

Arrays: One Dimensional and Two Dimensional, Strings, Vectors, Wrapper Classes. Interface: Defining Interface, Extending Interface, implementing Interface, Accessing Interface Variable. Exception Handling: Concepts of Exceptions, Types of Exception, Try and Catch keyword, Nested Try and Catch.

Thread Concepts and Applet:

Threads: Creating Threads, Extending Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, and Synchronization. Package: System Packages, Using System Package, Adding a Class to a Package, Hiding Classes.

Applets: Local and Remote Applets, Writing Applets, Applets life cycle, Creating an executable Applet, Designing a Web Page. Applet Tag, Adding Applet to HTML file, running the Applet. Passing parameters to Applets, Aligning the display, HTML Tags and Applets, Getting input from the user.

Referential Books:

1. E. Balagurusamy. "Programming in Java", TMHPublications.
2. PeterNorton,"PeterNortonGuidetoJavaProgramming",TechmediaPublications.
3. Naughton, Schildt. "The Complete Reference JAVA 2",TMH.
4. Dustin R. Call way, "Inside Servlets", AddisonWesley.

Dot Net and C# Programming

The .Net Framework:

Introduction, DLL Hell, CLR, CTS, MSIL

Basle C#:

Introduction , Data Types , Identifiers . Arrays , Error Handling

Win Forms Programming:

Introduction, Window Controls - Textbox , Radio . Checkbox . Combo, Picture Box , Menu , Tab , Progress Bar , List view , Report Viewer

OOPS in .Net:

Base Class Library, Namespace and its importance , System Namespace & Other Important Namespaces , Class / Object , Inheritance , Polymorphism , Abstract Class , Interfaces , Events & Delegates

Process and Threads:

Threads, Creation/Stopping Of Threads, Thread Pool Concept , Monitoring a thread , Synchronizing Multiple Threads

Assemblies & their Importance:

Assemblies, Private Assembly, Signing an Assembly, Shared Assemblies, Reflection

Referential Books:

1. C# Black Book by Matt Telles
2. Complete Reference ASP. Net by MacDonand,TMH
3. C# Programming Bible by Jeff Ferguson, Brian-Patterson,Wiley
4. Wrox'sVisualC#2005ExpressEdition,byF.Scott-Barker,Wiley

Cyber Law and Internet Security**Internet Security:**

Security Issues on Web, Importance of Firewall, Components of firewall, Transaction Security. Emerging Client Server, Security Threats, Network Security, Factors to Consider in Firewall Design. Limitation of Firewalls.

Encryption:

Encryption Techniques.Symmetric Encryption- Keys and Data Encryption Standard, Asymmetric Encryption- Secret Key Encryption. Public and Private Pair Key Encryption, Digital Signatures and its requirement.

Fundamentals of Cyber Law :

Jurisprudence or cyber , Object and Scope of the IT Act, introduction to Indian Cyber Law, Indian Perspective, Overview' of Intellectual property related legislation in India, Patent, Copy Right, Trademark law.

Investigation and Ethics:

Cyber Crime. Cyber Jurisdiction, Cyber Crime and Evidence Act, Ethical Issues in Data and Software Privacy, Plagiarism, Software Piracy, Viruses, Trojan horse, Malicious Code & Logic Bombs, Introduction to Biometric Security and its Challenges.

Referential Books:

1. Harish Changer "Cyber Law and IT Protection", PHI Publication
2. Merkov, Breithaupt, "Information Security", PearsonEducation
3. Farooq Ahmad, "Cyber Law in India", Pioneerbooks.
4. K. K. Singh, Akansha Singh "Information Security and Cyber law", UmeshPublication.

Software Engineering**Evolution & Scope of Software Engineering:**

Introduction to Software Engineering Software development process, life Cycle models — Waterfall, Spiral, Evolutionary.Prototype

SoftwareProduction Process:

Process Models - Methodologies; Standards

Software Project Management:

P; Project Planning; Cost estimation — Loc, Function point, COCOMO; Work estimation; Resource

estimation; Risk Analysis. Project scheduling; Quality Plans; Project control

Software Testing:

Black box vs White Box, Testing in the large vs Testing in the small, System Testing; Debugging; Validation vs Verification

Software Design:

Abstraction; Modularity; Cohesion; Coupling

Software Quality Assurance:

Quality Models; Software Quality Assurance Activities, Software configuration management; Software Reliability; Introduction to SEI-CMM

Software Maintenance:

Maintenance concepts and tasks; Side effects; Reverse Engineering; Re-engineering

Referential Books:

1. Software Engineering: Ian Sommerville, Pearson Education
2. Software Engineering: R. S. Pressman, McGrawHill
3. An Integrated Approach to Software Engineering: Pankaj Jalote

SEMESTER-V

BCA COURSE STRUCTURE & SYLLABUS

Semester	Courses/ Papers	CoursesCode	COURSE TITLE	Theory/ Practical	Credits	Evaluation (MM-100)	
BCA-V Sem	I	B230501T	DESIGN AND ANALYSIS OF ALGORITHMS	T	4	25	75
	II	B230502T	INTRODUCTION TO PYTHON	T	4	25	75
	III	B230503T	DATA COMMUNICATION AND NETWORKS	T	4	25	75
	IV	B230504T	INTERNET AND WEB DESIGN	T	4	25	75
	V	B230505P	WEB PROGRAMMING LAB.	P	4	25	75
	VI	B230506R	MINOR PROJECT	R	5	25	75

Design and Analysis of Algorithms

Algorithm Analysis Techniques:

Recurrences: substitution, iteration and master methods.

Divide-and-conquer: general approach, binary search. Matrix multiplication.

Greedy algorithms: general approach. Activity selection, knapsack problem, minimum-spanning tree, Dijkstra's algorithm, Huffman code.

Dynamic Programming:

General approach, matrix-chain multiplication, all-pairs shortest paths, binary search tree, traveling salesperson, 0/1 knapsack problem

Backtracking:

N-queen problem, sum of subsets, knapsack problem, generation of all cliques, traveling salesperson problem, Graph coloring.

Lower Bound Theory:

Decision tree, Reduction method; Amortized analysis; NP-completeness; Approximation algorithms

Referential Books:

1. Fundamental of Computer algorithms - Horowitz and Sahni
2. Design Methods and Analysis of Algorithms — S.K.Bosu
3. The Design and Analysis of Computer Algorithms — Aho, Hopcraft and Ullaman

Introduction to Python

Unit I

Basics: Python Interpreter, writing code in Jupyter Notebook, Indentation, comments, importing a module, binary operators, standard scalar data types, type casting, if-else statements, loops(while, for), pass, range, ternary expressions.

Unit II

Data Structures and Sequences: Tuples, Lists and slicing, Built-in Sequence functions, Dictionary, Sets; List, Set, and Dict Comprehensions. Functions: Namespaces, Scope, and Local Functions; Returning Multiple Values.

Unit III

Functions: Anonymous (Lambda) Functions, Partial Argument Application, Generators. Objects and Methods in Python. NumPy: creating N-dimensional arrays, arithmetic with NumPy arrays, basic indexing and slicing, Psuedorandom number generation.

Unit IV

Pandas: Overview of Series and DataFrames, reading data from csv file, DataFrame operations- working with data using functions like head, tail, info, shape, reshape, columns, isnull, dropna, mean, sum, describe, value_counts, corr, loc, iloc, apply.

Unit V

Matplotlib- plotting basic figures, subplots, line plots, bar plots, histograms, scatter plots. Overview of Scikit-learn, SciPy, networkx. Basic Errors and Exception handling. Basic File Handling. Applications of python.

Referential Books:

1. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython, by Wes McKinney, O'Reilly Media, 2017
2. Python All-in-One for Dummies, by John Shovic and Alan Simpson, John Wiley & Sons, Inc., 2019
3. Programming in Python 3: A Complete Introduction to the Python Language, Mark Summerfield, Pearson.
4. Swaroop, C. H. (2003). A Byte of Python. Python Tutorial.
5. Introduction to Computation and Programming Using Python. By John V. Guttag, MIT Press.
6. Learning Python, Mark Lutz, David Ascher, O'Reilly
7. T. Budd, Exploring Python, TMH, 1st Ed, 2011

Web Resources:

1. <https://www.learnpython.org/>

2. <https://nptel.ac.in/courses/106/106/106106212/>
3. <http://greenteapress.com/thinkpython/thinkpython.pdf>
4. Python tutorial: <https://docs.python.org/3/tutorial/index.html>

Data and Communication Networks

Basic Concept:

Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks. OSI and TCP/IP Models. Layers and their functions, comparison of models. Digital Transmission: Interfaces and Modems DTE-DCE Interface, Modems, Cablemodems.

Transmission Media:

Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon capacity. comparison of media.

Telephony:

Multiplexing, error detection and correction: Many to one, one to many, WDM, TDM, FDM, Circuit switching, packet switching and message switching. Data link control protocols: Line discipline, flow control. Error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures. Point to point controls: Transmission states, PPP layers, LCP, Authentication, NCP. ISDN: Services, Historical outline, subscriber's access, ISDN Layers and broadcast ISDN.

Devices:

Repeaters, bridges, gateways, routers, The Network Layer; Design issues, Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet. Transport and upper layers in OSI Model' Transport layer functions, connection management, functions of session layers, presentation layer and application layer.

Referential Books:

1. Computer Networks :Tanenbaum,A.S
2. Data Communication and Networking :Forouzan,B.A

Internet and Web Design

Internet and WWW:

What is Internet? Introduction to internet and its applications, E- mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers. domainname server, internet address World Wide Web (WWW) : World Wide Web and its evolution, uniform resource locator (URL). Browsers - internet explorer, Netscape navigator, opera, Firefox, chrome, mozilla. Search engine, web saver - apache, IIS, proxy server, HTTP protocol.

Web Programming:

Programming in Java: Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking. Event handling. Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Communication Issues, the Client, Multi-departmental A Large scale Websites, Quality Assurance and testing, Technological advances and Impact on 4'eb Teams.

HTML:

Formatting Tags, Links, List, Tables. Frames, forms. Comments in HTML, DHTML.

JavaScript:

Introduction, Documents, Documents, forms, Statements, functions. objects in JavaScript, Events and Event Handling, Arrays, FORMS. Buttons. Checkboxes, Text fields and Text areas.

XML:

Introduction, Displaying an XML Document, Data Interchange with an XML document, document type definitions, Parsers using XML, Client-side usage, Server Side usage.

Common Gateway Interface (CGI), PERL, RMI, COM/DCOM. VBScript, Active Server Pages (ASP).

Referential Books:

1. Shishir Gundavarma, "CGI Programming on the World Wide Web". O'Reilly & Associate
2. DON Box. "Essential COM", Addison Wesley.
3. Greg Buczek, "ASP Developer's Guide". TMH.

SEMESTER-VI

BCA COURSE STRUCTURE & SYLLABUS

BCA-VI Sem	ELECTIVE (Choose AnyTwo Papers)	I	B230601T	E COMMERCE AND APPLICATION	T	4	25	75
		II	B230602T	ADVANCED DATA BASE MANAGEMENT SYSTEM	T	4	25	75
		III	B230603T	ADVANCED COMPUTER ARCHITECTURE	T	4	25	75
		IV	B230604T	NETWROK MANAGEMENT AND SECURITY	T	4	25	75
		V	B230605T	OPTIMIZATION TECHNIQUES	T	4	25	75
		VI	B230606T	IMAGE PROCESSING	T	4	25	75
	VII	B230607R	MAJOR PROJECT	R	16	25	75	

Candidates who are promoted to Semester VI have to choose any two papers of their interest from the following list of Electives.

Elective I and Elective II:

- 1 E-Commerce and Applications
- 2 Advanced Data Base Management System
- 3 Advanced Computer Architecture
- 4 Network Management and Security
- 5 Optimization Techniques
- 6 Image Processing

E-Commerce and Applications

Introduction:

The Scope of Electronic Commerce, Definition of Electronic Commerce. Electronic E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective Business Strategy in an Electronic Age. Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains. Competitive Strategy, Porter's Model, First Mover Advantage Sustainable Competitive Advantage. Competitive Advantage using E-Commerce, Business Strategy, Introduction to Business Strategy, Strategic Implications of IT. Technology, Business Environment, Business Capability, Exiting Business Strategy, Strategy Formulation & Implementation Planning, E-Commerce Implementation, E-Commerce Evaluation.

Business-to-Business Electronic Commerce:

Characteristics of B2B EC, Models of B2B EC, Procurement Management Using the Buyer's Internal Marketplace, Just in Time Delivery, Other B2B Models, Auctions and Services from Traditional to Internet Based EDI. Integration with Back-end Information System, The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI, EDI: The Nuts and Bolts, EDI & Business.

Internet and Extranet:

Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment, The Extranets, The structures of Extranets, Extranet products & services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues. Electronic Payment Systems: Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet. Stored — value Cards and E- Cash, Electronic Check Systems. Prospect of Electronic Payment Systems, Managerial Issues.

Public Policy:

From Legal Issues to Privacy: EC-Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy. Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection In EC Infrastructure For EC It takes more than Technology, A Network Of Networks, Internet Protocols, Web-Based client/ Server, Internet Security, selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.

Referential Books:

1. E-Commerce- David Whiteley, Tata McGraw Hill
2. Electronic Commerce- Eframi Turban. Jae Lee. David King, K. Michele Chung.

Advanced Data Base Management System

Query Processing, Optimization & Database Tuning: Algorithms for Executing Query

Operations. Heuristics For Query Optimizations, Estimations Of Query Processing Cost, Join Strategies For Parallel Processors, Database Workloads, Tuning Decisions, DBMS Benchmarks, Clustering & Indexing, Multiple Attribute Search Keys, Query Evaluation Plans, Pipelined Evaluations, System Catalogue In RDBMS.

Extended Relational Model & Object Oriented Database System: New Data Types, User Defined Abstract Data Types, Structured Types, Object Identity, Containment, Class Hierarchy, Logic Based Data Model, Data Log, Nested Relational Model And Expert Database System.

Distributed Database System: Structure Of Distributed Database, Data Fragmentation, and Data Model,

Query Processing, Semi Join Parallel & Pipeline Join, Concurrency Control In Distributed Database System, Recovery In Distributed Database System, Distributed Deadlock Detection And Resolution. Commit Protocols.

Enhanced Data Model For Advanced Applications: Database Operating System, Introduction To Temporal Database Concepts, Spatial And Multimedia Databases, Data Mining, Active Database System, Deductive Databases, Database Machines, Web Databases, Advanced Transaction Models, Issues in Real Time Database Design. Introduction to Expert Database and Fuzzy Database System.

Referential Books:

1. Majumdar & Bhattacharya, "Database Management System", TMH.
2. Korth, Silbertz, Sudarshan, " Database Concepts", McGraw Hill
3. Elmasri. Navathe, "Fundamentals Of Database Systems", AddisonWesley.

Advanced Computer Architecture

CPU architecture:

Comparative study of 32-bit processors, Comparative study of Microcontrollers; Future Trends,

Parallel Processing Systems:

Flynn's Classification, Pipeline Processors, Instruction Pipelining, Internal Forwarding. Pipe line Hazards, Job Sequencing & Collision prevention, interleaved Memory, Vector Processing, Design of Factorizing compilers, Automatic detection of parallelism, Amdahl's law, Case studies of vector processors, Array processors. Network design issues, Mesh Network, Barrel Shifter. Cube, Hypercube. Parallel algorithms on hyper cubes, Multiprocessor system. Multiprocessor interfacing schemes, Tightly & loosely coupled systems

Other Architectures:

RISC; Comparison with CISC; Parameter passing in RISC, Comparison of commercial RISC systems; Data flow architectures; Comparison with control flow systems; Template implementation; Transputer architecture; Communication channels; Occam & programming environment.

Referential Books:

1. Computer Architecture & Parallel processing — Hwang & Briggs
2. Advanced Computer Architecture- KHwang
3. Designing Efficient Algorithms for parallel Computers- M.J. Quinn
4. Introduction to Parallel Algorithms- Joseph A

Network Management and Security

Introduction:

Attack, Services and Mechanism, Model for Internet Security. Cryptography: notion of Plain Text, Encryption, Key, Cipher Text. Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

Network Security:

Authentication Application: Kerberos, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

IP security Architecture:

Overview, Authentication header, Encapsulating Security Payload combining Security Associations, Key Management. Web Security: Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

Network Management Security:

Overview of SNMP Architecture- SNMP V1 communication Facility SNMPV3. System Security: Intruders, Viruses and Related Threats, Firewall Design Principles. Comprehensive examples using

available software platforms/case tools. Configuration Management.

Referential Books :

1. Networks Security Essentials: Application & Standards- W.Stallings
2. Cryptography and Network Security, Principles and Practice.- W.Stallings

Optimization Techniques

Linear programming:

Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.

Queuing Theory:

Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models (Model-1, Model-11).

Replacement Theory:

Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement. Inventory Theory Cost involved in inventory problem- single item deterministic model economics long size mode! Without shortage and with shorter having production rate infinite and finite.

Job Sequencing:

Introduction, solution of sequencing problem Johnsons algorithm form jobs through 2 machines.

Referential Books:

1. Gillet B.E. "Introduction to Operation Research"
2. Taha, H.A. "Operation Research - an introduction"
3. Kanti Swarup "Operation Research"
4. S.D. Sharma "Operation Research"

Image Processing:

Introduction: Image representation and modeling, 2-D linear system. Luminance, Contrast And Brightness, Color representation, Visibility functions, Monochrome and color vision model Image Quantization and Image Transforms. Sampling theorem, Anti-aliasing, image quantization, Orthogonal and unitary transforms, DFT, Cosine transform. Hadamard transform, Haar transform, KL transform.

Image Enhancement: Point operation. Histogram modeling, Filtering and spatial operations, Transform operations, Multi-spectral Image Enhancement

Image Restoration: Image formation models, Noise models. Inverse and Wiener filtering, Least square filters, Recursive filters, Maximum entropy method, Blind de-convolution, Bayesian method of noise removal, Image reconstruction, Tomography, Radan transform, Back-projection, Reconstruction algorithm, Algebraic method of reconstruction, Fan-beam reconstruction.

Data Compression: Data compression vs. Bandwidth, Pixel coding. Predictive coding. Transform coding, Coding of two-tone images.

Referential Books:

1. Fundamentals of Digital Image Processing: Anil K. Jain
2. Digital Image Processing: R.C. Gonzalez & R.E. Woods
3. Digital Image Processing: W.K. Pratt

**Proposal for LL.M. Ordinance of Prof. Rajendra Singh
(RajjuBhaiya) State University, Prayagraj, U.P.**

Whereas Prof. Rajendra Singh (RajjuBhaiya) University established in Prayagraj in the year 2017 has successfully completed its journey of five years along with its affiliated colleges, and

Whereas Several affiliated Colleges are successfully running LL.B. Three Year and B.A.LL.B. Five Year Integrated Courses, and

Whereas a number of law graduates of the University are willing to pursue their academic pursuits through their studies in LL.M. and Research in Law,

It is, therefore, expedient and fair to have a separate Faculty of Law and to start LL.M course in the University for conducting higher and specialized studies in Law,

And therefore, the following ordinances are hereby proposed for the LL.M. Course of study and award of degree of the Master of Laws of the University:

Draft - Ordinances

An ordinance to introduce the degree of Master of Laws in the Professor Rajendra Singh (RajjuBhaiya) University Prayagraj, U. P.

1. This ordinance shall be known as the Professor Rajendra Singh (RajjuBhaiya) State University Prayagraj, LL.M. Ordinances, 2022, (The PRSU LL.M. Ordinance-2022).
2. This Ordinance and the Regulations made there under shall regulate the admission, course – structure, conducting the studies, examination and award of degree to a LL.M. student of the university or its affiliated college/institute.
3. This ordinance shall come into force from session 2022-23 or from a date specified and declared by the University.
4. **Definition:**In these ordinances and the Regulations made thereunder, unless the context otherwise requires-
 - (a) ‘Academic Council’ means the academic council of PRSU, Prayagraj, U.P.
 - (b) ‘Admission’ means admission to the first year class of LL.M. course of the University.
 - (c) ‘Candidate’ means a person who fulfills the requirements provided in these ordinances and Regulations for admission or examination of LL.M. course of this University
 - (d) ‘College or Institute’ means any affiliated college or institute of the University.

(e) 'University' means Prof. Rajendra Singh (RajjuBhaiya) University, Prayagraj, U.P. (the PRSU).

5. The LL.M. Course of the University shall be of a duration of two years divided into four semesters of six months each.
6. Maximum duration for completing the course by any student shall be four years.
7. The number of seats available for admission to LL.M. Course shall be decided by the Academic Council of the University.
8. **Eligibility for admission:** A student who has passed LL.B. Three year Degree Course or LL.B. Five Year Degree course as per Bar Council of India norms from any University recognized under the U.G.C Act, 1956 shall be eligible for admission to LL.M. course of study,

Provided however that the University may, by its regulations permit a student to apply for admission to this course, who has appeared in the final examination of LL.B. Three Year or B.A LL.B. Five Year Course of his University.

9. The University shall decide if the course will be run on Regular or Self-financed basis and shall fix the fee-structure accordingly.
10. The course structure of LL.M. shall be such as provided in the Regulation made under this ordinance and any change in the course structure can be made by the academic council of University on the recommendation of the Board of Studies of Law.
11. After successfully completing the studies in a semester the student shall be required to appear in the Semester-examination and shall be promoted to the next higher semester if he is declared pass or eligible for promotion according to the Regulations of the course.
12. Result of the students shall be declared by Cumulative Grade Point Average System.
13. The Degree of LL.M. shall be awarded to the students who after taking admission in the course have completed the course of study, have been declared successful in the examination and have otherwise been worthy of the degree of LL.M. of the University.
14. The University may on application of an affiliated college/institute already running LL.B. Three Year or LL.B. Five Year course permit such college/institute to run LL.M. course on receipt of a satisfactory report of an Inspection Committee comprising three senior professors of law nominated by the Vice-chancellor.
15. Any amendment in these ordinances can be done by a resolution passed by the Academic Council in this regard.

Proposed Regulations for LL.M Course of PRSU, Prayagraj, U.P.

(A) Admission:

1. The University/College/Institute shall invite application for admission to LL.M. course against the number of sanctioned seats for admission to the course.
2. Eligible candidates shall be required to apply for admission on the form prescribed by the University/College/Institute.
3. Admission shall be granted up to the limit of available seats on the basis of merit of the candidate based on his marks/index of earlier examinations or his performance in the entrance test taken by the University/College/Institute for such admission.

Provided that the rules for reservation in admissions for different social category of candidates as applicable under law shall apply to these admissions.

4. The University may provide in the admission rules for preferences, restrictions, discount, weightage or premium applicable to different category of candidates.
5. The University reserves the right to refuse admission to any candidate without assigning reasons and to make changes from time to time, in the rules and procedure governing admissions to LL.M. course.
6. A candidate who has made any false entry in his prescribed admission form, or has omitted, concealed or misrepresented any relevant information, or appended any false document therewith, shall forfeit his claim for admission or the admission as the case may be.
7. The Fee-Structure of the LL.M. Course shall be such as decided by the University or the College/Institute concerned.

(B) Course of Study in LL.M.

1. The two year course of study of LL.M. shall be divided in four semesters of equal duration each.
2. Each semester shall be spread over a period of ten weeks. In semester I, II and III a student shall be required to study two core papers and two Optional Papers from Optional Papers Group A, Optional Papers Group B and Optional Papers Group C as given below respectively.
3. Each paper in LL.M. shall be of 24 credits. The teaching in an Optional Paper shall be done only if minimum five students opt to study the paper.

4. In semester IV the student will be required to study two compulsory papers and will write a dissertation in consultation with his supervisor assigned for dissertation.
5. The dissertation shall be evaluated for 8 credits and viva-voce examination for 4 credits.
6. The course of study shall comprise:

Semester I

1. Constitution and New Challenges
2. Law and Justice Delivery System
3. } Two Optional Papers from Optional Paper Group A Below
4. }

Group 'A' of Optional Papers

1. Corporate Management and Ethics
2. Intellectual and Industrial Property Law - I
3. Criminology and Penology
4. Comparative Family Law of Marriage, Divorce and Succession
5. Law Relating to Women and Child Rights.

Semester II

1. Comparative Constitutional Systems
2. Aspects of Social and Economic Justice
3. } Two Optional Papers from Optional Papers Group B Below
4. }

Group 'B' of Optional Papers

1. Administrative Action and Judicial Review
2. Intellectual and Industrial Property Law-II
3. Law of Information Technology
4. Media and Law
5. Legislative Drafting and Interpretation of Statutes

Semester III

1. Environmental Law
2. Criminal Justice Administration and Human Rights

3. } Two Optional Papers from Optional Paper Group C Below
4. }

Group 'C' of Optional Papers

1. Law of Torts and Disaster Management
2. International Economic Trade Law
3. Taxation Laws and Reforms
4. Consumer Protection and Competition Law
5. International Human Rights

Semester IV

1. Law and Social Change
2. Research Methodology
3. }
4. } Dissertation in lieu of Papers (3) and (4)

(C) Examinations:

1. Every student who after taking admission in the course completed his course of studies in any semester will be required to appear and pass an examination organized by the University at the end of every semester.
2. For each paper of the semester the maximum marks shall be 100 (one hundred).
 - (a) In theory papers there shall be an internal evaluation of 25 marks and an internal evaluation for 75 marks.
 - (b) For internal evaluation three tests of 12.5 marks each will be taken by the University/College/Institute and two better scores of the student will be considered for award of internal marks and the minimum one shall be ignored.
 - (c) External evaluation for 75 marks in each paper will be done by the examiners appointed by the University for that purpose.
 - (d) Students will be required to submit their dissertation in the University latest by the date notified by the University and shall also appear for viva-voce examination on the date notified by the university/ concerned college or institute.
 - (e) Evaluation of the dissertation will be done by the external examiners appointed by the University.
3. Mark-sheet of students will be prepared by credit and Grading System on the basis of the marks obtained by the student.

4. In respect of use of unfair means by the students in the examinations the ordinances of the University shall apply.
5. At the end of each semester a marks-sheet shall be issued to every student indicating subject-wise marks and result by the award of grade for that semester to be indicated as SGPA ie, Semester Grade Point Average.
6. A student will be promoted to the next higher semester only if he has secured a total of 60% credit. In case he secures less than 60% credit he will be required to take admission and study in the corresponding semester of the next academic session.
7. At the end of the Fourth semester in the Final Result of a student will be declared by the award of CGPA ie, Cumulative Grade Point Average.
8. Pattern for calculation of credit and Grading will be the same as applicable to Other Post-Graduate Courses of the University.

(D) Course Credit Scheme in tabular form

1. For each Core and Optional Paper there will be 4 hours of teaching per week.
2. Duration of examination of each paper shall be 3 hours.
3. Each paper will be of 100 marks out of which 75 marks shall be allocated for semester examination and 25 marks for internal assessment.

Semester	Core Courses			Elective Course			Total Credits
	No. of papers	Credits (L+P) 4+2	Total Credits	No. of papers	Credits (L+T/P)	Total Credits	
I	02	06	12	02	06	12	24
II	02	06	12	02	06	12	24
III	02	06	12	02	06	12	24
IV	02	06	12	Dissertation		8	24
				Viva		4	
Total Credits for the Course							96

Abbreviation:

L= Lectures
P= Presentation

***NOTE:** Detail Syllabi of each paper to be prepared by subject experts.