

SYLLABUS
Of
3 YEARS BCA COURSE
Under



PATLIPUTRA UNIVERSITY
PATNA

From
ACADEMIC SESSION 2025-2026

Minimum Eligibility for Admission:

**10+2 / Intermediate or Equivalent in any Discipline with minimum
45% Marks from a Recognised Board.**

(Himanshu Ojha)
Dept. of MCA
College of Commerce
Arts & Science, Patna

(Aditya Singh Suman)
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Dept of MCA & BCA
Arcade Business College
Patna

BCA – 1st YEAR

HONS. PAPER	SUBJECTS	THEORY MARKS	INTERNAL PRACTICAL MARKS
I	Computer Fundamentals	75	25
	Office Automation Application (MS Office)		
	Web Application – HTML, CSS & JavaScript		
II	Programming Logic and Algorithm with C Language	75	25
	Operating System with Linux and Windows		
	Software Analysis and Design (SAD)		
SUBSIDIARY PAPERS	SUBJECTS	MARKS	
I	Subsidiary I	100	
II	Subsidiary II	100	
Composition	Hindi	100	

BCA – 2nd YEAR

HONS. PAPER	SUBJECTS	THEORY MARKS	INTERNAL PRACTICAL MARKS
III	Data Structure using C	75	25
	Digital System And Computer Organization & Architecture		
	Object Oriented Technology using C++		
IV	Core Java	75	25
	Computer Network and Internet Technology		
	Python with Mini Project		
SUBSIDIARY PAPERS	SUBJECTS	MARKS	
I	Subsidiary I	100	
II	Subsidiary II	100	
Composition	Hindi	100	

BCA – 3rd YEAR

HONS. PAPER	SUBJECTS	THEORY MARKS	INTERNAL PRACTICAL MARKS
V	VB.Net	75	25
	Database Management System and SQL Server		
VI	PHP : Server Side Scripting	75	25
	Introduction to Artificial Intelligence		
	Multimedia		
VII	Practical and VIVA	100	
VIII	Project work to design any Business Application and VIVA	100	
SUBSIDIARY PAPERS	SUBJECTS	MARKS	
GS	General Studies	100	

BCA 1st Year:

Hons-I:

Paper 1: Computer Fundamentals

Paper 2: Office Automation Application (MS Office)

Paper 3: Web Application – HTML, CSS & JavaScript

Hons-I:

Paper 1: Programming Logic and Algorithm with C Language

Paper 2: Operating System with Linux and Windows

Paper 3: Software Analysis and Design (SAD)

BCA 2nd Year:

Hons-III:

Paper 1: Data Structure using C

Paper 2: Digital System And Computer Organization & Architecture

Paper 3: Object-Oriented Technology using C++

Hons-IV:

Paper 1: Core Java

Paper 2: Computer Network and Internet Technology

Paper 3: Python with Mini Project

BCA 3rd Year:

Hons-V:

Paper 1: VB.Net

Paper 2: Database Management System and SQL Server

Paper 3: Object-Oriented Technology using C++

Hons-VI:

Paper 1: PHP : Server Side Scripting

Paper 2: Introduction to Artificial Intelligence

Paper 3: Multimedia

Hons. VII: Practical

Hons. VIII: Project work to design any Business Application and VIVA

DETAILED SYLLABUS

BCA-Ist Year

Hons Paper. I:

Full Marks – 100

(Theory – 75, Practical – 25)

1.) Computer Fundamentals

Introduction to computers: What is a computer? Comparison between computer and human brain, Characteristics and computer application

History of Computer: Initial development, Generation of computer, Evolution of personal computers.

Types of printers: Hard copy output, Impact printers, Non impact printers, Serial and line Printer, Dot matrix printers, Laser printers, Daisy wheel printers, Drum and chain printers, Thermal printers.

External storage device: SASD, DASD, Punch card, Magnetic Tapes, Blocking utilization factor, Magnetic Disk, Tracks, Sectors Seek Time, Rotational latency, Access time, Numerical problems.

Type of Computers: Digital, Analog, Hybrid computers, General purpose computers, Micro computers, Mini computers, Mainframes Super computers.

Data Representation: Number system, binary to decimal and decimal to binary conversion, Binary addition, 2's complement representation, Binary subtraction, ASCII and EBCDIC coding.

Computer Software: Machine language, Assembly language, High level languages, Compilers, Interpreters Assemblers, Centralized processing, Decentralized processing, Distributed processing, Management Information System.

Processing Modes: Uniprocessor, Multiprocessor, Multiprocessor, Batch processing, off-line data entry, on-line processing, online data entry, Real time processing, Time sharing processing, Electronic mail, Tele Text Tele conferencing.

Programming Concept: Program definition, Characteristics of a good program, Programming steps, algorithms, and flow charts.

DOS (Disk Operating System)

Introduction to file management system. Directory structure in DOS. Internal and external commands. Batch files, Configuration files, System Files, COM, BIN, SYS, EXE & TEXT files.

Practical

Visit to computer lab. Introduction to various components of a Computer. A Simple Documentation preparation and printing steps. Usage of printer and Other components.

2.) Office Automation Application (MS Office)

MS Word

MS Excel

MS Powerpoint

Practical

Office application to create MS Word Documents, spreadsheets, and Presentations.

3.) Web Application – HTML, CSS and JavaScript

Introduction, Document layout, block-oriented elements, Lists, Inline Elements, Visual Markup, Hypertext Link, URL, Image, Forms, Tables, Style Sheets.

Introduction to JavaScript, Syntax, Variables, Values, Data Types, Keywords and reserved words, Variable declaration and scope, Block scope.

Expressions and Operators, Control structures, Flow control and conditionals, Loops and iteration, Error handling, Working with Numbers, String, Objects, Arrays, Functions,

Hons Paper. II:

1.) Programming Logic and Algorithm with C Language

Unit I

- Overview of C
- Introduction & features of C
- Structure of C programming
- Variable, Expression, Identities, Keywords, Data types, Constants
- Operator: Arithmetic, Logical, Relational Conditional, and Bit wise Operators
- Type conversion in Expression

Unit II

- Basic I/O and library function
- Single character I/O ,i.e. getch(), getchar(), getche(), putchar()
- Formatted I/O i.e. printf(), and scanf()
- Library Functions Concepts Mathematical and character functions
- Control structure
- If statement, if Else Statement Nesting of if else Statement, else if ladder
- The ?: Operator(ternary Operator)
- Switch Statement
- Compound Statement
- Loop statement
- For, While, Do-while loops
- Break, continue, goto statement

Unit III-Array

- Single and Multi Dimensional array
- Array declaration and initialization of arrays
- String: declaration and initialization, string functions

Unit IV-Function

- Functions
- The need and form of C function
- User defined and library Functions
- Function arguments

- Calling of functions
- Return values and nesting of functions
- Recursion
- Array as function argument
- Scope and life of variable,local and global variable
- Storage class specifier auto ,extern,static,register
- Unit V-Structure & Union
- Structure & Union
- Define Structure
- Declaration of Structure variable
- Accessing structure member
- Nested structure
- Array of structure
- Structure assignment
- Structure as function argument
- Union

Unit VI-Pointer

- Basic of pointer,pointer operators ,pointer and function
- Passing arrays to functions
- Array pointers
- Pointer of string,pointer to structure ,pointer within structure

Unit VII-The process of memory allocation

- Malloc() function
- Sizeof() Operator
- Function calloc()
- Function free()
- Function realloc()

Unit VIII-File structure

- File handling function Operator file and closing file
- File pointer
- Text file
- Binary file
- Writing and reading a character
- fopen(),getc(),putc(), &fclose() function

- feof() function
- Working with string fputs&fgets
- Flushing stream
- Direct access file

Unit IX-The Pre-processor

- # define
- Defining macros
- # error
- # include
- Conditional compilation directive i.e. #if , #else, #elif, and #ifdef& #undef

Unit X

- Initialize graphics mode
- Function added in graphics

Unit XI

- Creations of windows
- Text attributes control
- Extended Keyword code
- Menu design
- Word processing

2.) Operating System with Linux and Windows

Introduction to various categories of software. Operating System and its function. Interaction of OS (Operating System) with hardware and user program. Various components of OS with reference to DOS, BIOS, and DOS interrupt. Single user operating system, Task loader Multi processing and real time operating system.

Process management and scheduling, Mutual Exclusion, Semaphore, Deadlock.

Memory management module, Partitioning, Paging, segmentation, Virtual memory.

I/O Device management, control of various devices. Device driver interrupts, driven and poll driven data tasking.

File Management, Disk scheduling, Replacement technique.

Special requirement and facilities for multiprocessing operating system. Introduction to UNIX. User management in UNIX, UNIX Commands.

Working with Windows Operating System

3.) Software Analysis and Design (SAD)

Introduction to SAD: Fundamentals of System, Classification of Systems, Real Time Systems, Distributed Systems, Development of a successful System, Various Approaches for development of Information Systems, MIS

Systems Analyst: Why do Businesses need Systems Analysts? Users, Role of a Systems Analyst

Process of System Development: Systems Development Life Cycle, Phases of SDLC

Introduction to Documentation of Systems: Concepts and process of Documentation

Types of Documentation, System Requirements Specification, System Design Specification

Quality of Software : Different types of quality criteria.

Process of System Planning: Fact finding Techniques, Feasibility Study, Cost Benefit Analysis, Preparing Schedule (GANTT Chart, PERT Chart)

Modular and Structured Design: Design Principles, Modularity, Coupling, Cohesion

System Design and Modelling: Data Flow Diagrams, Data Modeling, E-R Diagrams, Process Specification Tools, Decision Tables, Decision Trees, Data Dictionary

Forms and Reports Design: Forms, Reports, Differences between Forms and Reports, Sample Design, Types of Information, Criteria for Report Design

File Organizations: Sequential File, Indexed Sequential, Random File System

BCA-IIInd Year

Hons Paper. III:

Full Marks – 100

(Theory – 75, Practical – 25)

1.) Data Structure using C

Introduction to data structure

Concept of data structure

Abstract data structure

Analysis of algorithm

The Concept of list

Stack and Queue

Introduction to stack and primitive operation on stack

Stack as an abstract data structure

Multiple Stack

Stack Application : infix, postfix, prefix and recursion

Introduction to queue and primitive operation on queue

Queues as an abstract data structure

Circular queue

Dequeue

Priority queue

Linked List

Introduction to linked list of stack

The linked list of queue

Header nodes

Doubly Linked list

Circular Linked List

Stack and Queue as a circular linked list

Application of linked list

Tree

Basic Terminology

Binary Tree

The tree representation as array and linked list

Binary Tree representation

Traversal of binary tree: Inorder, Preorder, Postorder

Application of binary tree

Threaded binary tree

B tree and Height Balanced tree, representation of B+ and B*

Counting Binary trees

Searching and Sorting

Sequential searching

Binary Search

Selection Sort

Insertion sort

Quick sort

Bubble sort

Radix sort

Heap sort

Comparison of sorting methods

Tables and Graphs

Hash table

Collision resolution technique

Introduction to graph

Definition

Terminology

Directed, Undirected, & Weighted graph

Representation of graphs

Graph Traversal Depth first & breath first search

Spanning Tree, minimum Spanning tree

The Basic Greedy Strategy for Kruskal and Prims.

2.) Digital System and Computer Organization & Architecture

Introduction, Data Representation ,Number Systems, Decimal Representation in Computers, Alphanumeric Representation, Data Representation For Computation, Fixed Point Representation, Decimal Fixed Point Representation, Floating Point Representation.

Logic Gates, Logic Circuits ,Combinational Circuits, Canonical and Standard Forms, Minimization of Gates, Design of Combinational Circuits, Adders ,Encoder ,Decoders ,Multiplexer, RAM, Registers

Sequential Circuits, Flip Flops , Types of Flip- Flops

K-Map

Error Detection And Correction Codes

Basic Computer Organization: Introduction to Microprocessor, Block Diagram of computer, Selection criteria of microprocessor, Instruction, Types of Instruction, instruction Cycle, Register Organization, Bus, Interrupts, Interrupt Cycle, Booting process.

Memory Organization: Types of memory, Cache Memory, memory Mapping, Virtual Memory Concept, DMA.

I/O Organization: I/O Modules, Mode of data transfer from I/O to memory. Introduction to pipelining.

3.) Object Oriented Technology using C++

- Introduction to object Oriented Programming(OOP) and c++
- Objects
- Polymorphisms
- Inheritance
- C++ fundamental
- Classes and Objects
- Function and Overloading

- Operator Overloading
- Constructor and destructor
- Multiple Inheritance
- Passing Objects to function
- Array of objects
- Pointers to Objects
- C++ I/O Class library
- C++ Stream
- C++ Pre-defined streams
- C++ Stream Classes

Hons Paper. IV:

Full Marks – 100

(Theory – 75, Practical – 25)

1.) Core Java

Java program structure, tokens, Java Virtual Machine, Constants and variables, Data types, Declaration of variables and scope of variable, type casting

Operators : Arithmetic, relational, logical, assignment, increment and decrement, conditional, Bit wise, Special Expression and its evaluation.

Decision making and branching: if statement, if else statement, nesting of if else statement, if else ladder, switch statement:operatorloops: do-while, for, while, jumping loops, labeled loops

Classes, Objects, Methods: Defining class, adding variable and methods, creating object, accessing class member, constructor, methods of overloading, static member, nesting of methods

Inheritance: Extending, a class, Overriding methods, final variables and methods, final classes, finalize methods, abstracts methods and classes, visibility controls

Arrays: One dimensional and two dimensional, string and vectors, wrapper class

Interface and package: Defining interface, Extending interfaces, Implementing interfaces, Accessing Interface, Creating and importing packages

Multithreading : Creating Threads, Extending thread class, stopping and blocking thread, life cycle of thread, thread exception, thread priority, synchronization, implementing the run ableinterface.

Applet Programming: Local and Remote Applet vs. Application writing Applet, Applet life cycle, Creating and Executing Applets, designing a web page, Applet tag, adding Applet to HTML, Running the Applets, Passing parameters to Applets, Aligning the display

2.) Computer Network and Internet Technology

Introduction to the N/W. Basic Requirements for network.Network Topologies.Classification of Computer Network.Data and Signal. Communication Channels: Twisted Wide, Co-axial

Wire, optical fibre, Radiowave Communication, Microwave Communication, Satellite Communication, VSAT.

Switching Techniques: Circuit Switching, Message Switching, Packet Switching, FEP, Repeater, Bridge, Gateway, Token Passing CSMA/CD protocols.

Network Models: ISO: OSI model, TCP/IP Model

Network devices: Hub, Switch, Bridge, Router, Gateways, Modem

Internet Technology:

Internet, Evolution, Protocols, Interface Concept, Internet Vs Intranet, Growth of internet, DNS, ISP, Connectivity Dial Up, Leased Line, VSAT ect., URLs, Domain names, Portals, application.

E-mail Concept, POP and Web Based E-mail, address, Basics of sending and receiving E-mail, protocols, mailing list, Free E-mail services.

3.) Python with Mini Projects

An Introduction to Python

Python Syntax, Python Installation, The print statement, Comments, Python Data Structures & Data Types, String Operations, Simple Input & Output, Simple Output Formatting, Operators in python

Python Program Flow: Indentation, If statement, loop statements, Break & Continue, Assert

Functions & Modules: Functions Parameters, Variable Arguments, Scope of a Function, Function Documentations, Lambda Functions & map

Create a Module: Standard Modules

Exceptions Handling

File Handling: File handling Modes, Reading Files,

OOPs In Python

BCA-IIIrd Year

Hons Paper. V:

Full Marks – 100

(Theory – 75, Practical – 25)

1.) VB.Net

Introduction of .Net Framework. The basics of VB.NET programming. The Common Language Run Time and .Net Class Framework.

Introduction of Visual Basic and its components Solution Explorer, References, Assembly Information Screen, The Properties Window and The New Code Window.

Programming Structures Cover Data Types, Reference Types, Object Oriented Terminology, Working with Objects, Creating Classes, Overloading Methods, Constructors, Shared Methods, etc.

Inheritance and Interface Implement inheritance i.e. creating base class, subclass and using 'inherit' keyword; Overloading and overriding methods, Shadowing, and Object interface in detail.

Generics Types, Generics Methods, Creation of Generics, Classes & inheritance, Structures, Interfaces, Constraints and Generics & late binding.

Namespace Concept of Namespace, Common Namespace, Importing Namespace, Referencing Namespaces and Creating own Namespaces.

Error handling Structured Exception Handling i.e. The Try, Catch and Finally keywords; Throw keyword, Throwing a new exception, Nested try ; and Error Logging i.e. The Event log, Events, methods & properties and Writing to trace files.

Data Access with ADO.NET Cover Architecture Enhancements, .Net Data Providers, DataSet Components and Building Data Access Components.

XML Introduction on XML and study in detail about XML Serialization & XML Stream-Style Parsers.

Threading

2.) Database Management System and SQL Server

Introduction to Database Management System: Architecture of DBMS, Basic elements of DBMS, Database Models: Hierarchical Model, Network Model, E-R Model, Relational Model.

Three Level of views, Specialization and Generalization, Schema, Data Dictionary

RDBMS: Codde's Rules, Relational operations, Key concepts, Normalization

SQL language using SQL Server

1.) PHP : Server Side Scripting

Introduction to PHP:

PHP configuration in IIS & Apache Web server

PHP Variable: Static & global variable, GET & POST method

PHP Operator: Conditional Structure & Looping Structure, Array

User Define Function: argument function, default argument, variable function, return function

Variable Length Argument Function, Variable Function, String Function, Math Function, Date Function

Array Function: Count, list, in_array, current, next, previous, end, each, sort, rsort, assort, arsort, array_merge, array_reverse

Miscellaneous Function: define, constant, include, require, header, die

File handling Function

PHP COMPONENTS

PHP GD Library

PHP Regular expression function

Cookies

Session

Server variable

Database Connectivity with MySQL

2.) Introduction to Artificial Intelligence

Introduction and basics of AI.

Branches of AI.

Application of AI.

Knowledge Base System and its architecture.

Knowledge representation, acquisition, organization and manipulation

Dealing with uncertainty

Natural Language Processing

Resolution

Problem Space Search

3.) Multimedia

Introduction, Multimedia presentation and production, characteristics of a multimedia presentation, Multiple media, Hardware and software requirements, Uses of multimedia, Promotion of multimedia-based contents, steps for creating multimedia presentation.

Text, Image, Audio and Video

Hons Paper. VII:

Full Marks – 100

1.) Practical and VIVA

Hons Paper. VIII:

Full Marks – 100

1.) Project Work to design a business application.