

BCA (2022-23) Syllabus semester wise with Marks Break-up

Semester	Paper Code	Paper Name	External Marks	Internal Marks	Total Marks	L	T	P	Credits
Semester - I	BCA101 T	Programming Principles Using Python	75	25	100	3			3
	BCA102 T	Computer System Architecture	75	25	100	3			3
	BCA103	Introduction to Innovation and Entrepreneurship	75	25	100	3	1		4
	BCA104	Business Communication	75	25	100	3	1		4
	BCA105	Foundation of Mathematics for Computer Applications	75	25	100	3	1		4
	BCA101 P	Practical Lab for Programming Principles Using Python			50			3	2
	BCA102 P	Practical Lab for Computer System Architecture			50			3	2
				600				22	

Semester	Paper Code	Paper Name	External Marks	Internal Marks	Total Marks	L	T	P	Credits
Semester - II	BCA201 T	Object Oriented Programming Using C++	75	25	100	3			3
	BCA202 T	Concepts of Data Structure	75	25	100	3			3
	BCA203	Management Information System	75	25	100	3	1		4
	BCA204	Introduction to Soft Computing	75	25	100	3	1		4
	BCA205	Discrete Mathematics	75	25	100	3	1		4
	BCA201 P	Practical Lab for Object Oriented Programming Using C++			50			3	2
	BCA202 P	Practical Lab for Data Structure			50			3	2
				600				22	

Semester	Paper Code	Paper Name	External Marks	Internal Marks	Total Marks	L	T	P	Credits
Semester - III	BCA301 T	JAVA Programming and Dynamic Web Design	75	25	100	3			3
	BCA302 T	Operating System	75	25	100	3			3
	BCA303	Computer Network	75	25	100	3	1		4
	BCA304	Android Programming	75	25	100	3	1		4
	BCA305	Elements of Statistics	75	25	100	3	1		4
	BCA301 P	Practical Lab for Java Programming			50			3	2
	BCA302 P	Practical Lab for Operating System			50			3	2
				600				22	

Semester	Paper Code	Paper Name	External Marks	Internal Marks	Total Marks	L	T	P	Credits
Semester - IV	BCA401 T	Introduction to DBMS	75	25	100	3			3
	BCA402 T	Design and Analysis of Algorithm	75	25	100	3			3
	BCA403	Software Engineering	75	25	100	3	1		4
	BCA404	Introduction to Cloud Computing	75	25	100	3	1		4
	BCA405	Numerical Methods	75	25	100	3	1		4
	BCA401 P	Practical Lab for DBMS			50			3	2
	BCA402 P	Practical Lab for DAA			50			3	2
				600				22	

Semester	Paper Code	Paper Name	External Marks	Internal Marks	Total Marks	L	T	P	Credits
Semester - V	BCA501 T	Computer Graphics & Animation	75	25	100	3			3
	BCA502 T	Web & Internet Technologies	75	25	100	3			3
	BCA503	Data Mining	75	25	100	3	1		4
	BCA504	Information Security	75	25	100	3	1		4
	BCA505	Minor Project			50		1	2	2
	BCA506	Viva-Voice on Minor Project			50			2	1
	BCA501 P	Practical Lab for Computer Graphics & Animation			50			3	2
	BCA502 P	Practical Lab for Web & Internet Technologies			50			3	2
				600				21	

Semester	Paper Code	Paper Name	External Marks	Internal Marks	Total Marks	L	T	P	Credits
Semester - VI	BCA601	Theory of Computation	75	25	100	4			4
	BCA602	Artificial Intelligence	75	25	100	3	1		4
	BCA603	Machine Learning	75	25	100	3	1		4
	BCA604	Digital Image Processing	75	25	100	3	1		4
	BCA605	Major Project			150		3	6	5
	BCA606	Presentation/Se minar based on Major Project			50				1
				600				22	

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA301 T	JAVA Programming and Dynamic Web Design	3			3

UNIT-I

Java Programming: Data types, control structured, arrays, strings, and vector, classes (inheritance, package, exception handling) multithreaded programming.

UNIT-II

Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager, string handling (only main functions)

UNIT-III

Networking (datagram socket and TCP/IP based server socket) event handling, JDBC: Introduction, Drivers, Establishing Connection, Connection Pooling.

UNIT-IV

HTML: use of commenting, headers, text styling, images, formatting text with , special characters, horizontal rules, line breaks, table, forms, image maps, <META> tags, <FRAMESET> tags, file formats including image formats.

UNIT-V

Java Servlets: Introduction, HTTP Servlet Basics, The Servlet Lifecycle, Retrieving Information, Sending HTML Information, Session Tracking, Database Connectivity

UNIT-VI

Java Server Pages: Introducing Java Server Pages, JSP Overview, Setting Up the JSP Environment, Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output.

Referential Books:

1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference" 199, TMH.
2. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998.
3. Ivor Horton, "Beginning Java-2" SPD Publication
4. Jason Hunter, "Java Servlet Programming" O'Reilly
5. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998
6. Hans Bergsten, "Java Server Pages", 3rd Ed. O'reilly

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA302 T	Operating System	3			3

UNIT-I

Introduction, What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal – Computer Systems, Parallel systems, Distributed systems, Real- Time Systems.

Memory Management: Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation

Virtual Memory: Demand Paging, Page Replacement, Page- replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations

UNIT-II

Processes: Process Concept, Process Scheduling, Operation on Processes

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling.

Process Synchronization: Background, The Critical – Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization

UNIT-III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-IV

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap- Space Management, Disk Reliability

UNIT-V

Information Management: Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System, Physical File system File – System Interface; File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File – System Implementation: File – System Structure, Allocation Methods, Free- Space Management

Referential Books:

1. Silberschatz and Galvin, “ Operating System Concepts”, Person, 5th Ed. 2001
2. Madnick E., Donovan J., “ Operating Systems:,Tata McGraw Hill,2001
3. Tannenbaum, “Operating Systems”, PHI, 4th Edition, 2000

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA303	Computer Network	3	1		4

UNIT-I

Basic Concepts: 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, Cable modems.

UNIT-II

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

UNIT-III

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.

UNIT-IV

Devices: Repeaters, bridges, gateways, routers, The Network Layer; Design issues, Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet.

UNIT-V

Transport and upper layers in OSI Model: Transport layer functions, connection management, functions of session layers, presentation layer and application layer.

Referential Books:

1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4th Ed. 2003.
2. Behrouz A.Forouzan, "Data Communication and Networking", 3rd Ed. Tata MCGraw Hill, 2004.
3. William stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002.

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA304	Android Programming	3	1		4

Unit-I

Introduction: Review to JAVA & OOPS Concepts, History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture, Android components including activities, view and view group, services, content providers, broadcast receivers, intents, parcels, instance state.

Unit-II

User Interface Architecture: application context, intents: explicit intents, returning results from activities, implicit intents, intent filter and intent resolution, and applications of implicit intents, activity life cycle, activity stack, application's priority and its process' states, fragments and its life cycle.

Unit-III

User Interface Design: Layouts, optimizing layout hierarchies, form widgets, text fields, button control, toggle buttons, spinners, images, menu, dialog.

Unit-IV

Broadcast receivers, notifications and services: Broadcast sender, receiver, broadcasting events with intents, listening for broadcasts with broadcast receivers, broadcasting ordered intents, broadcasting sticky intents, pending intents, creating notifications, setting and customizing the notification tray UI. Create, start, and stop services, binding services to activities, using asynctasks to manage background processing, handler, looper and runnable 112

Unit-V

Database and Content provider: SQLite, Content Values and Cursors, creating SQLite databases, querying a database, adding, updating, and removing rows, Creating Content Providers, implement content provider's queries and its usage.

Text Books:

1. Griffiths, D., & Griffiths, D., (2015). Head First Android Development, O'reilly Media.
2. Meier, R.,(2012). Professional Android™ 4 Application Development. John Wiley & Sons, Inc.
3. Murphy, M. L. (2018). The Busy Coder's Guide to Android Development, Commons Ware
4. Phillips, B., Stewart, C., Hardy, B. & Marsicano, K. (2015). Android Programming: The Big Nerd Ranch Guide. Big Nerd Ranch. Guides.

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA305	Elements of Statistics	3	1		4

UNIT-I

Population, Sample and Data Condensation

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

UNIT-II

Measures of Central Tendency

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

UNIT-III

Measures of Dispersion:

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

UNIT-IV

Permutations and Combinations

Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). $nPr = n!/(n-r)!$ (without proof). Combinations of 'r' objects taken from 'n' objects. $nCr = n!/(r!(n-r)!)$ (without proof). Simple examples, Applications.

UNIT-V

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, Addition theorem of probability without Proof (upto three events are expected). Definition of conditional probability Definition of independence of two events, simple numerical problems.

UNIT-VI

Statistical Quality Control

Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for X and R; Control charts for number of defective {n-p chart} ,control charts for number of defects {c - chart}

Referential Books:

1. S.C.Gupta - Fundamentals of statistics - Sultan chand & sons , Delhi.
2. D.N.Elhance - Fundamentals of statistics - Kitab Mahal, 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.
5. Hogg R.V. and Craig R.G. – Introduction to mathematical statistics Ed 4 {1989} – Macmillan Pub. Co. Newyork.
6. Gupta S.P. – Statistical Methods , Pub – Sultan Chand and sons New Delhi

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA301 P	Practical Lab for JAVA Programming and Dynamic Web Design			3	2

Practical will be based on Paper Java Programming & Web Design: on Whole Syllabus

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA302 P	Practical Lab for Operating System			3	2

Practical will be based on the Paper Operating System. On whole syllabus.

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Course Code	Course Name	L	T	P	C
BCA401 T	Introduction to DBMS	3			3

UNIT-I

Introduction: Characteristics of database approach, data models, DBMS architecture and data independence.

UNIT-II

E-R Modeling: Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.

UNIT-III

File Organization: Indexed sequential access files; implementation using B & B++ trees, hashing, hashing functions, collision resolution, extendible hashing, dynamic hashing approach implementation and performance.

UNIT-IV

Relational Data Model: Relational model concepts, relational constraints, relational algebra
SQL: SQL queries, programming using SQL.

UNIT-V

EER and ER to relational mapping: Data base design using EER to relational language.

UNIT-VI

Data Normalization: Functional Dependencies, Normal form up to 3rd normal form.
Concurrency Control: Transaction processing, locking techniques and associated, database recovery, security and authorization. Recovery Techniques, Database Security

Referential Books:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill, 1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A.K.Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.
4. Bipin Desai, "An Introduction to database systems", Galgotia Publications, 1991.

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA402 T	Design & Analysis of Algorithm	3			3

Unit – I

Introduction: Algorithm, Analysis of algorithm, Designing Algorithm, Mathematical Foundations, Growth of functions, Summation, Recurrence relation, Sets, Counting & Probability.

Unit – II

Divide & Conquer: Searching: Binary search, Sorting: Counting Sort, Radix Sort, Bucket Sort, Selection Sort, Heap Sort, Merge sort, Quick sort, Greedy Methods – Minimum spanning tree, Dijkstra's Algorithm for shortest paths from a single source, Fractional Knapsack problem, Optimal storage on tapes.

Unit – III

Dynamic Programming: Application to various problems (for reference; Weighted Interval Scheduling, Sequence Alignment, Knapsack), their correctness and analysis. Greedy Algorithms: Application to various problems, their correctness and analysis.

Unit – IV

Back Tracking: 8 Queen Problem, Chromatic number, Graph coloring, Coloring of tree.

Unit – V

Branch & Bound: Traveling salesman problem

Unit –IV

Advanced Analysis Technique: Amortized analysis

Books:

1. Kleinberg, J., & Tardos, E. (2013). Algorithm Design. 1st edition. Pearson Education India.
2. Cormen, T.H., Leiserson, C.E. Rivest, R.L., & Stein, C. (2015). Introduction to Algorithms. 3rd edition. PHI.
3. Sarabasse & Gledler A. V. (1999). Computer Algorithm – Introduction to Design and Analysis. 3rd edition. Pearson Education
4. Horowitz & Sahani, (2008) Fundamental of Computer Algorithms: (Second Edition)

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA403	Software Engineering	3	1		4

UNIT-I

Software Engineering: Definition and paradigms, A generic view of software engineering.

UNIT-II

Requirements Analysis: Statement of system scope, isolation of top level processes and entities and their allocation to physical elements, refinement and review.

Analyzing a problem, creating a software specification document, review for correctness, consistency, and completeness.

UNIT-III

Designing Software Solutions: Refining the software Specification; Application of fundamental design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; Creating design document: Review of conformance to software requirements and quality.

UNIT-IV

Software Implementation: Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style and review of correctness and readability.

UNIT-V

Software Maintenance: Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adoptive, corrective), designing for maintainability, techniques for maintenance.

UNIT-VI

Comprehensive examples using available software platforms/case tools, Configuration Management.

Referential Books:

1. K.K.Aggarwal & Yogesh Singh “Software engineering”, 2nd Ed., New Age International 2005.
2. I.Sommerville, “Software Engineering”, Addison Wesley, 2002.
3. James Peter, W. Pedrycz, “Software Engineering: An Engineering Approach” John Wiley & Sons.

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA404	Introduction to Cloud Computing	3	1		4

UNIT-I

Computer Networks, basics of networking, Architectures of networking, topologies, types of Networks ,LAN,WAN,MAN, Network Components, Protocols, Communication aspects, basics of internet.

UNIT-II

Client-Server Computing, Cluster Computing, Grid Basics, Distributed Computing. Introduction to Cloud Computing, Introduction to Software as a Service (SaaS), Infrastructure as a Service (IaaS), and Platform as a Service (PaaS).

UNIT- III

Understanding Google Cloud, Google Apps, Google Compute Engine (GCE) ,Google App Engine. Amazon Services, Amazon Web Services, Amazon EC2.

UNIT-IV

IBM Cloud Computing with its PaaS, IBM as Saas and IBM as IaaS. Red hat Cloud Computing with its PaaS.

UNIT-V

Microsoft Azure Cloud Computing Service- Windows azure platform Services, Windows Azure storage, Windows Azure fabrics.

UNIT-VI

Salesforce Cloud Computing Services Pass, SaaS and IaaS. Heroku and Force.com as PaaS.

Text Books:

1. Mastering Cloud Computing, Buyya, R., Vecchiola, C., Selvi, S.T., McGraw Hill Education; First edition (2017)
2. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra and Geoffrey Fox, Morgan Kaufmann, 2011

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA405	Numerical Methods	3	1		4

UNIT-I

Roots of Equations: Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.

UNIT-II

Interpolation and Extrapolation : Finite Differences, The operator E, Newton's Forward and Backward Differences, Newton's dividend differences formulae, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Starling formula, Bessel's formula, Laplace- Everett formula.

UNIT-III

Numerical Differentiation Numerical Integration : Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's three-eight rule.

UNIT-IV

Solution of Linear Equation: Gauss's Elimination method and Gauss's Siedel iterative method.

UNIT-V

Solution of Differential Equations: Euler's method, Picard's method, Fourth-order Runge-Kutta method.

Referential Books:

1. Scarbourogh, "Numerical Analysis".
1. Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata, 3. S.S.Shashtri, "Numerical Analysis", PHI

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA401 P	Practical Lab for DBMS			3	2

Practical will be based on the Paper Introduction to DBMS. On whole Syllabus.

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA402 P	Practical Lab for DAA			3	2

Practical will be based on the Paper Design and Analysis of Algorithm. On whole Syllabus.