

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	

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Course Code	Course Name	L	T	P	C
BCA501 T	Computer Graphics and Animation	3			3

UNIT-I

Introduction: Advantage of Computer Graphics and Areas of Applications, Hardware and Software for Computer Graphics. (Hard Copy, Display Technologies), Random Scan Display System, Video Controller, Random Scan Display Processor, Raster Graphics, Scan Conversion Algorithms (Line, Circle, Ellipse), Area Filling (Rectangle, Ellipse), Clipping (Lines, Circle, Ellipse), Clipping Polygons

UNIT-II

Two dimensional and three dimensional transformations, 2-Dimensional transformation, 2-D Translation, Rotation, Scaling, Homogeneous Coordinates, Reflection, Shear transform, 3-dimensional transformation, 3-D Translation, Rotation Scaling, Reflection, Shear.

UNIT III

The Physical Layer: Functions of Physical Layer, Data and Signals: Analog and Digital signals, Transmission Impairment, Data Rate Limits, Performance, Data Transmission Media: Guided Media, Unguided Media and Satellites, Bandwidth Utilization: Multiplexing and Spreading, Switching: Circuit switching, Message switching & Packet switching, Telephone, Mobile and Cable network for data Communication.

UNIT-IV

Clipping: Window to view port transformation, Clipping, line clipping, Cohen —Sutherland line clipping, Polygon clipping, Sutherland and Gary Hodgman polygon clipping algorithm

UNIT-V

Visible Surface Determination and computer graphics algorithm: Image space and object space techniques, Hidden Surface removal—Depth comparison, Z-Buffer Algorithm, Back-Face Removal, The Painter's Algorithm, Scan-Line Algorithm, Light and Color and different color models (RGB, CMY, YIQ)

UNIT-VI

Animation and virtual reality: Basic Principles of Animation and Types of Animation, Introduction to the flash interface, Setting stage dimensions, working with panels, panel layouts, Layers & Views, Shaping Objects – Overview of shapes, Drawing & Modifying Shapes, Bitmap Images & Sounds, Animation - Principles, Frame by frame animation, tweening, masks, Introduction to virtual reality.

Text Books:

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & practice, 2000.
2. D.Haran & Baker. Computer Graphics Prentice Hall of India, 1986
3. D.J. Gibbs & D.C. Tsichritz: Multimedia programming Object Environment & Frame work, 2000
4. The Animator's Survival Kit by Richard Williams, November 2009

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Course Code	Course Name	L	T	P	C
BCA502 T	Web and Internet Technologies	3			3

Unit-I

Introduction: Network address translation, Subnet Masking, Difference between Intranet and Internet, Working of Internet, Dynamic and Static Routing, Domain Name Server , networking tools - ipconfig, ping, netstat, traceroute 53

Unit-II

Introduction to Internet Protocols: HTTP, HTTPS, FTP, SMTP, IMAP, POP3, VoIP

Unit-III

Web Servers: Introduction, Working, Configuring, Hosting and Managing a Web server, Proxy Servers: Introduction, Working, Type of Proxies, setting up and managing a proxy server Client-side Technologies, Server-side Technologies and hybrid technologies

Unit-IV

Javascript, jQuery, JSON, NODE.js, BOOTSTRAP, Introduction to forums, blogging, portfolio, developing a responsive website, Combining Web Applications and Mobile Applications

Unit-V

Search Engines - components, working, optimization, Crawling, BOTS

Unit-VI

Introduction to cookies and sessions, Introduction to e-commerce websites and e-carts.

Text Books:

1. DComer. (2018). The Internet Book: Everything You need to know about Computer networking and how the internet works. 5th edition. CRC Press.
2. Patel, B & Barik, L.B , Internet & Web Technology , Acme Learning Publisher
3. Bayross, I. (2013). Web enabled commercial application development using HTML, JavaScript, DHTML and PHP. 4th edition. BPB Publication.
4. Godbole, A. S.& Kahate A (2008). Web Technologies. Tata McGrawHill

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Course Code	Course Name	L	T	P	C
BCA503	Data Mining	3	1		4

Unit-I

Introduction to Data Mining: Applications of data mining, data mining tasks, motivation and challenges, types of data attributes and measurements, data quality.

Data Pre-processing - aggregation, sampling, dimensionality reduction, Feature Subset Selection, Feature Creation, Discretization and Binarization, Variable Transformation.

Unit-II

Classification: Basic Concepts, Decision Tree Classifier: Decision tree algorithm, attribute selection measures, Nearest Neighbour Classifier, Bayes Theorem and Naive Bayes Classifier, Model Evaluation: Holdout Method, Random Sub Sampling, Cross-Validation, evaluation metrics, confusion matrix.

Unit-III

Association rule mining: Transaction data-set, Frequent Itemset, Support measure, Apriori Principle, Apriori Algorithm, Computational Complexity, Rule Generation, Confidence of association rule.

Unit-IV

Cluster Analysis: Basic Concepts, Different Types of Clustering Methods, Different Types of Clusters, K-means: The Basic K-means Algorithm, Strengths and Weaknesses of K-means algorithm, Agglomerative Hierarchical Clustering: Basic Algorithm, Proximity between clusters, DBSCAN: The DBSCAN Algorithm, Strengths and Weaknesses.

Text Books:

1. Han, J., Kamber, M., & Jian, P. (2011). Data Mining: Concepts and Techniques. 3rd edition. Morgan Kaufmann
2. Tan, P.-N., Steinbach, M., & Kumar, V. (2005). Introduction to Data Mining. 1st Edition. Pearson Education.
3. Hand, D., & Mannila, H. & Smyth, P. (2006). Principles of Data Mining. Prentice-Hall of India.

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Course Code	Course Name	L	T	P	C
BCA504	Information Security	3	1		4

Unit-I

Introduction: Security Concepts, Challenges, Security architecture, Security attacks, security services, security mechanisms

Unit-II

Error detecting/correction: Block Codes, Generator Matrix, Parity Check Matrix, Minimum distance of a Code, Error detection and correction, Standard Array and syndrome decoding, Hamming Codes

Unit-III

Cryptography: Encryption, Decryption, Substitution and Transposition, Confusion and diffusion, Symmetric and Asymmetric encryption, Stream and Block ciphers, DES, cryptanalysis. Public-key cryptography, Diffie-Hellman key exchange, man-in-the-middle attack Digital signature, Steganography, Watermarking.

Unit-IV

Malicious software's: Types of malwares (viruses, worms, trojan horse, rootkits, bots), Memory exploits - Buffer overflow, Integer overflow

Unit-V

Security in Internet-of-Things: Security implications, Mobile device security - threats and strategies.

Text Books:

1. Stallings, W. (2018). Cryptography and network security. 7th edition. Pearson Education.
2. Pfleeger, C.P., Pfleeger, S.L., & Margulies, J. (2015). Security in Computing. 5th edition. Prentice Hall
3. Whitman M.E., & Mattord H.J. (2017). Principle of Information Security. 6th edition. Cengage Learning.

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Course Code	Course Name	L	T	P	C
BCA505	Minor Project		1	2	2

Evaluation will be based on Summer Training held after fourth semester and will be Conducted by the college committee only.

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Course Code	Course Name	L	T	P	C
BCA506	Viva-Voce on Minor Project			2	1

The viva will be conducted based on summer training of **four weeks after the end of fourth Semester** and will be Conducted by the college committee only.

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Course Code	Course Name	L	T	P	C
BCA501 P	Practical Lab for Computer Graphics & Animation			3	2

Practical will be based on the Paper Computer Graphics & Animation. On whole Syllabus.

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Course Code	Course Name	L	T	P	C
BCA502 P	Practical Lab for Web & Internet Technologies			3	2

Practical will be based on the Paper Web & Internet Technologies. On whole Syllabus.

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Course Code	Course Name	L	T	P	C
BCA601	Theory of Computation	3	1		4

Unit-I

Languages: Alphabets, string, language, basic operations on language, concatenation, union, Kleene star.

Unit-II

Regular Expressions and Finite Automata: Regular expressions, Deterministic finite automata (DFA).

Unit-III

Regular Languages: Non-deterministic Finite Automata (NFA), relationship between NFA and DFA, Transition Graphs (TG), properties of regular languages, the relationship between regular languages and finite automata, Kleene's Theorem.

Unit-IV

Non-Regular Languages and Context Free Grammars: Pumping lemma for regular grammars, Context-Free Grammars (CFG),

Unit-V

Context-Free Languages (CFL) and PDA: Deterministic and non-deterministic Pushdown Automata (PDA), parse trees, leftmost derivation, pumping lemma for CFL, properties of CFL.

Unit-VI

Turing Machines and Models of Computations: Turing machine as a model of computation, configuration of simple Turing machine, Church Turing Thesis, Universal Turing Machine, decidability, halting problem.

Text Books:

1. Cohen, D. I. A. (2011). Introduction to Computer Theory. 2nd edition. Wiley India.
2. Linz, P. (2016). An Introduction to Formal Languages and Automata. 6th edition. Jones and Bartlett Learning.
3. Lewis & Papadimitriou (1997), Elements of the theory of computation – 2nd Edition PHI

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Course Code	Course Name	L	T	P	C
BCA602	Artificial Intelligence	3	1		4

Unit-I

Introduction: Introduction to artificial intelligence, background and applications, Turing test, rational agents, intelligent agents, structure, behavior and environment of intelligent agents, Ethics in AI.

Unit-II

Knowledge Representation: Propositional logic, first order predicate logic, resolution principle, unification, semantic nets, conceptual dependencies, frames, scripts, production rules, conceptual graphs.

Unit-III

Reasoning with Uncertain Knowledge: Uncertainty, non-monotonic reasoning, truth maintenance systems, default reasoning and closed world assumption, Introduction to probabilistic reasoning, Bayesian probabilistic inference, introduction to fuzzy sets and fuzzy logic, reasoning using fuzzy logic.

Unit-IV

Problem Solving and Searching Techniques: Problem characteristics, production systems, control strategies, breadth first search, depth first search, hill climbing and its variations, heuristics search techniques: best first search, A* algorithm, constraint satisfaction problem, means-end analysis.

Unit-V

Game Playing: introduction to game playing, min-max and alpha-beta pruning algorithms. Prolog Programming: Introduction to Programming in Logic (PROLOG), Lists, Operators, basic Input and Output.

Unit-VI

Understanding Natural Languages: Overview of linguistics, Chomsky hierarchy of grammars, parsing techniques.

Text Books:

1. Russell, S.J. & Norvig, P. (2015) Artificial Intelligence - A Modern Approach. 3rd edition. Pearson Education
2. Rich, E. & Knight, K. (2012). Artificial Intelligence. 3rd edition. Tata McGraw Hill
3. Patterson, D.W. (2015). Introduction to Artificial Intelligence and Expert Systems. 1st edition. Pearson Education.
4. Bratko, I. (2011). Prolog Programming for Artificial Intelligence. 4th edition. Pearson Education

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Course Code	Course Name	L	T	P	C
BCA603	Machine Learning	3	1		4

Unit 1

Introduction: Basic definitions, Hypothesis space and inductive bias, Bayes optimal classifier and Bayes error, Occam's razor, Curse of dimensionality, dimensionality reduction, feature scaling, feature selection methods.

Unit 2

Regression: Linear regression with one variable, linear regression with multiple variables, gradient descent, logistic regression, over-fitting, regularization. performance evaluation metrics, validation methods.

Unit 3

Classification: Decision trees, Naive Bayes classifier, k-nearest neighbor classifier, perceptron, multilayer perceptron, neural networks, back-propagation algorithm, Support Vector Machine (SVM), Kernel functions.

Unit 4

Clustering: Approaches for clustering, distance metrics, K-means clustering, expectation maximization, hierarchical clustering, performance evaluation metrics, validation methods.

Text Books:

1. Mitchell, T.M. (2017). Machine Learning. McGraw Hill Education.
2. Flach, P. (2015). Machine Learning: The Art and Science of Algorithms that Make Sense of Data. Cambridge University Press.
3. Haykins, S.O. (2010). Neural Networks and Learning Machines. 3rd edition. PHI.

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Course Code	Course Name	L	T	P	C
BCA604	Digital Image Processing	3	1		4

Unit-I

Introduction: Digital Image Fundamentals: Brightness, Adaptation and Discrimination, Light and Electromagnetic Spectrum, Image Sampling and Quantization, Some Basic Relationships between Pixels
Types of images.

Unit-II

Spatial Domain Filtering: Some Basic Intensity Transformation Functions, Histogram Equalization, Spatial Correlation and Convolution, Smoothing Spatial Filters: Low pass filters, Order Statistics filters; Sharpening Spatial Filters: Laplacian filter

Unit-III

Filtering in Frequency Domain: The Discrete Fourier Transformation (DFT), Frequency Domain Filtering: Ideal and Butterworth Low pass and High pass filters, DCT Transform (1D, 2D).

Unit-IV

Image Restoration: Image Degradation/Restoration Process, Noise models, Noise Restoration Filters
Image Compression: Fundamentals of Image Compression, Huffman Coding, Run Length Coding, JPEG.

Unit-V

Morphological Image Processing: Erosion, Dilation, Opening, Closing, Hit-or-Miss Transformation, Basic Morphological Algorithms.

Unit-VI

Image Segmentation: Point, Line and Edge Detection, Thresholding, Region Based Segmentation.

Text Books:

1. Gonzalez, R. C., & Woods, R. E. (2017). Digital Image Processing. 4th edition. Pearson Education.
2. Jain, A. K. (1988). Fundamentals of Digital Image Processing. 1st edition Prentice Hall of India.
3. Castleman, K. R. (1995). Digital Image Processing. 1st edition. Pearson Education
4. Gonzalez, R. C., Woods, R. E., & Eddins, S. (2004). Digital Image Processing using MATLAB. Pearson Education Inc.

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA605	Major Project		3	6	5

Evaluation will be based on held after fourth semester and will be Conducted by the College/University committee only.

Bachelors of Computer Application

Course Code	Course Name	L	T	P	C
BCA606	Presentation/Seminar based on Major Project				1

Presentation/Seminar based on Major Project will be evaluated by external examiner only.