

**Semester-V**

**B.C.A.**

**Academic Year: 2022-2023**

**BCA PART V Semester Academic Year: 2022-2023**  
**Course of studies for the BCA – V Semester**

**BCA – V Semester Course**

**SCHEME OF MARKS**

Course	Theory Max. Marks		Practical Max. Marks	Max. Marks	Min. Marks
	Internal	External			
<b>BCA – 501 Linear Algebra and Geometry</b>	15	85	--	100	5 + 28
<b>BCA -502 Computer Networks</b>	15	85	--	100	5 + 28
<b>BCA -503 Introduction to Cloud Computing</b>	15	85	--	100	5 + 28
<b>BCA -504 Introduction to Data Science</b>	15	85	--	100	5 + 28
<b>BCA -505 Human Values and Professional Ethics</b>	15	85	--	100	5 + 28
<b>BCA -506 Information Technology Trends</b>	15	85	--	100	5+28
<b>BCA -507 Network and Cloud Computing Lab</b>	--	--	50	50	17
<b>BCA -508 Practical on Data Science using R</b>	--	---	50	50	17
<b>Total Marks</b>	90	510	100	700	--

**Semester-V**  
**BCA – 501: Linear Algebra and Geometry**  
**Academic Year: 2022-2023**

**Min. Marks: 28**

**Max. Marks: 85**

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**Unit I**

Groups. Definition, Order of an element. Subgroups; Definition, Necessary and Sufficient Condition. Coset Decomposition. Right and Left Cosets, Lagrange's Theorem. Definitions and Basics of Normal Subgroups, Quotient Group, Homomorphism and Isomorphism of groups, Kernel of Homomorphism.

**Unit II**

Vector Spaces. Vector space, Subspace and Quotient Space, Linearly Dependent and Independent Vectors. Linear Maps. Definition and properties. Homomorphism and Isomorphism of Vector spaces, Kernel of a Linear Map.

**Unit III**

Matrix Representation of a Linear Map. Rank and Nullity of Linear Map. Fundamental Theorem of Vector Space Homomorphism. Eigen Values and Eigen vector of Matrix, Cayley Hamilton Theorem: Proof and Applications.

**Unit IV**

Parabolic, definition and description, Elliptical and Hyperbolic paraboloid, Parabolic of revolution. Tangent planes and Normal to a parabolic. The Ellipsoid, Tangent & Normal plane to it, director sphere of an ellipsoid, conjugate diameters and diametrical planes to ellipsoid, locus of chords.

**Unit V**

The definition and description, finding equation of Cone, standard equation, condition of general Quadratic equation representing cone. Angle between two generators, enveloping Cone of conicoid, right circular Cone. The Cylinder definition, equation, right circular Cylinder, enveloping cylinder to a conicoid.

**Text Books:**

- (1) Linear Algebra by I. N Herstein, Wiley Publisher.
- (2) Analytical Geometry of Three Dimensions by P. K. Jain, New Age International Publisher.

**Reference Books:**

- (1) Linear Algebra Schaum's Series by Seymour Lipschutz & Mark Lipson, Mc-Graw Hill Publisher.
- (2) Linear Algebra by S. N. Goel, Kedarnath Ramnath Publication, Meerut.
- (3) Linear Algebra by Kenneth Hoffman and Ray Kunze, Prentice Hall of India Pvt. Ltd. New Delhi.
- (4) Solid Geometry by M.L. Khanna, S.P Nigam, S.S. Gangwar, Jai Prakash Nath Publication Meerut.

- (5) Solid Geometry by P.N. Chatterjee, Ram Prasad & Sons Publisher Bhopal.
- (6) Coordinate Geometry of Three Dimensions by D.C Agrawal Shree Sai Prakashan Meerut .

**Semester-V**  
**BCA -502: Computer Networks**  
**Academic Year: 2022-2023**

**Min. Marks: 28**

**Max. Marks: 85**

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**Unit I**

Data communications and networking for Today's Enterprise, A communication model, Data Communications, Networking and the Internet. Network model, need for a protocol architecture, The TCP/IP protocol architecture, The OSI model, Addressing. Data transmission: Concept and terminology, Analog and digital signals, Transmission impairment, Channel capacity.

**Unit II**

Digital transmission: Digital-to-digital conversion, Analog-to-digital conversion, Transmission mode. Analog transmission, Digital-to-analog conversion, Analog-to-Analog conversion.

**Unit III**

Bandwidth utilization: Frequency division multiplexing, Wavelength division multiplexing, Synchronous and statistical time-division multiplexing, switching: Circuit switching Packet switching, Types of errors, framing (character and bit stuffing), error detection & correction method.

**Unit IV**

Data Link Layer protocols, LAN Protocol Architecture, Bridges, Emergence of High — Speed LANs, Ethernet, Token Bus, Token Ring, Wireless LAN Technology (Wi-Fi). Routing in switched network: Routing in packet switched networks,

**Unit V**

Internet and transport protocols: Principles of internetworking IPv4 & IPv6, Connection-oriented transport protocol mechanism, TCP and UDP. Network security: Encryption and decryption technique, Internet applications: E-mail, World Wide Web, And HTTP.

**Text Books:**

- (1) Data Communications and Networking, BehrouzA. Forouzan, McGraw-Hill, 4<sup>th</sup> Ed.,
- (2) A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI

**Reference Books:**

- 1) Computer Networking: James F. Kurore& Keith W. Rose , Pearson Education, Third Edition, 2005.
- 2) Communication Networks: Fundamentals Concepts and Key Architecture : Albert Leon-Garcia and IndraWidjaja , Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
- 3) Data and Network Communication: Michael A. Miller, Delmar Thomson Learning inc ISBN 0-07668-1100-X.

- 4) Introduction to Computer Networks: Douglas E. Comer , Prentice-Hall. Alberto Leon-Garcia and IndraWidjaja, Communication Networks –Fundamentals
- 5) Concepts and Key Architecture , Tata McGraw-Hill Publishing Company Limited, ISBN

**Semester-V**  
**BCA – 503: Introductions to Cloud Computing**  
**Academic Year: 2022-2023**

**Min. Marks: 28**

**Max. Marks: 85**

**Unit I**

Introduction to cloud computing, History, Importance of cloud computing in the current era, characteristics of cloud computing, what cloud computing really is and isn't, pros and cons of cloud computing, technologies in cloud computing, migrating into cloud.

**Unit II**

Types of clouds, cloud infrastructure, cloud application architecture, working of cloud computing, trends in cloud computing, cloud service models, cloud deployment models, cloud computing and services pros and cons.

**Unit III**

Cloud computing technology, cloud life cycle model, role of cloud modelling and architecture, cloud system architecture, virtualization, types of virtualization, importance and limitations of various types of virtualization, virtualization in cloud computing.

**Unit IV**

Data storage, introduction to enterprise data storage, data storage management, file system, cloud data stores, cloud storage characteristics, applications utilizing cloud storage.

**Unit V**

Introduction to web services, cloud service deployment tools, management/ administrative services, risk management in cloud computing, introduction to apache hadoop.

**Text Books:**

- (1) Cloud Computing: A practical approach for learning and implementation, 1<sup>st</sup> edition, Pearson, A. Srinivasan, J. Suresh.

**Reference Books:**

- 1) Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
- 2) Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
- 3) Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
- 4) Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

**Semester-V**  
**BCA – 504: Introduction to Data Science**  
**Academic Year: 2022-2023**

**Min. Marks: 28**

**Max. Marks: 85**

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**Unit I**

Introduction: What is Data Science? The Data Science Process, Different Types of Data: Quantitative, Categorical. Graphical Summaries of Data: Pie Chart, Bar Graph, Pareto Chart, Histogram. Measuring the Center of Quantitative Data: Mean, Median, Mode. Measuring the Variability of Quantitative Data: Range, Standard Deviation, and Variance.

**Unit II**

Overview of R, R data types: Vectors, Matrices, Factors, Lists, Data Frames, reading and writing data, Control structures, functions, scoping rules, dates and times

**Unit III**

Introduction to Data Cleansing, Missing and Repeated Values, Feature Engineering, Outliers and Errors, Finding Outliers, Cleaning Data with R.

**Unit IV**

Machine Learning: Definition and overview, Regression, Simple Linear Regression, Multiple Regression, Assessing Performance, Ridge Regression, Feature Selection & Lasso, Nearest Neighbors & Kernel Regression

**Unit V**

Machine Learning: Classification, Linear Classifiers & Logistic Regression, Learning Linear Classifiers, Over fitting & Regularization in Logistic Regression, Decision Trees, Handling Missing Data, Boosting.

**Text Books:**

- 1) Allan G. Bluman, Elementary Statistics: A Step By Step Approach, 10th Edition, McGraw-Hill, 2017.
- 2) Paul Teetor, R Cookbook, First Edition, O'ReillyMedia, 2011.
- 3) Tom Mitchell, Machine Learning, First Edition, McGraw Hill. 1997



**Semester-V**  
**BCA – 505: Human Values and Professional Ethics**  
**Academic Year: 2022-2023**

**Min. Marks: 28**

**Max. Marks: 85**

**Unit I**

Human Values; Types, Features and Classification Sources of Value System Values across Cultures.

**Unit II**

Morality Norms, Beliefs, Attitude Moral Norms, Moral Values Moral Standards

**Unit III**

Professional Ethics; Nature, Characteristics and Needs Ethics V/s Morals and Values Ethico-Moral Action Ethical Codes, Ethical Practices

**Unit IV**

Nature and Dimensions of Attitude Components of Attitude Attitude Formation Functions of Attitude Changing Attitude

**Unit V**

Moral Values and Character-Building Character; Meaning, Important Components of Character Character Development.

**Text Books:**

- 1) Beteille Andre (1991), Society and Politics in India, Athlone Press, Latest edition
- 2) Chakraborty S. K. (1999), Values and Ethics for Organizations, oxford university press, Latest edition
- 3) Fernando, A.C. (2009), Business Ethics - An Indian Perspective, Pearson Education, India, Latest edition

**Reference Books:**

- 1) Charles D. Fleddermann (2012), "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, (Indian Reprint), Latest edition
- 2) Boatright John R (2012), "Ethics and the Conduct of Business", Pearson Education, New Delhi, Latest edition
- 3) Crane, Andrew and Matten Dirk (2015), Business ethics, Oxford University Press Inc., New York., Latest edition
- 4) Murthy, C.S.V. (2016), Business Ethics – Text and Cases, Himalaya Publishing House Pvt. Ltd., Latest Edition
- 5) Naagrajan,R.R (2016), Professional Ethics and Human Values, New Age International Publications, , Latest edition
- 6) Campbell, V., & Bond, R. (1982). Evaluation of a character education curriculum. In D. McClelland, Education for values. New York: Irvington Publishers, Latest Edition.
- 7) R. S. Dwivedi (1995), "Human Relations and Organizational Behavior: A Global perspective", Macmillan Latest Edition

**Semester-V**  
**BCA – 506: Information Technology Trends**  
**Academic Year: 2022-2023**

**Min. Marks: 28**

**Max. Marks: 85**

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**Unit I**

Introduction and basic concepts of modern communication and telephony technology: CDMA, WLL, GSM, VOIP, Bluetooth, Wi-Fi, Communication Technology: 2G, 3G, 4G, 5G. Communication over Radio, Microwave systems, Communication satellites, Radar, Fiber optics, ISDN – their properties, Geographic Information System (GIS): Components of a GIS – Hardware, Software, Data, People, Methods, Working and application of GIS.

**Unit II**

Information Security - Introduction, Malicious Programs, Cryptography, Digital Signature, Firewall, Users Identification and Authentication, Security Awareness and policies, Application areas requiring security. Mobile Commerce: Introduction, Growth, Success stories of Mobile commerce, Technologies for mobile commerce, M-Commerce in India. Digital Marketing

**Unit III**

Data Warehouse and Data Marts: Introduction, Advantages of data warehouse, Data warehouse components, Data warehouse architecture and schemas. Big Data Concept, Data Mining: Introduction, Evolution of data mining, Data mining – verification versus discovery, Advantages of data mining, Technologies used in data mining.

**Unit IV**

Artificial Intelligence and Expert System: Concept of Artificial Intelligence and Expert System, Building of Expert System, Merits and Demerits of Expert System, Application of Expert System, Application of Artificial Intelligence

**Unit V**

Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Home automation, Industry applications, Surveillance and other IoT applications. Introduction to Virtual Reality: definition, Applications of VR. Smart Systems, Embedded systems,

**Text Books:**

- 1) Fundamentals of Information Technology by Alex Leon & M. Leon, Vikas Publications, New Delhi.
- 2) Frontiers of Electronic Commerce by Ravi Kalakota, Andrew B. Whinston, , Addison Wesley Longman Publication.
- 3) E-Commerce: An Indian Perspective (Second Edition) by S.J.P. T. Joseph, Prentice-hall Of India Pvt Ltd.
- 4) Security in Computing (Third Edition) by C.P.Pfleeger, S.L. Pfleeger, D.N. Shah, S.Ware, Prentice Hall 2002.
- 5) Mobile Communications, Joschen Schiller, Pearson Education.
- 6) Recent Magazines of Computers and Communication.

- 7) Cloud Computing PHI by Rao M.N.
- 8) Internet of Things McGrawHill by Raj Kamal

**Reference Books:**

- 1) Introduction to Information Technology - ITL Education Solutions Ltd., Seventh Impression, Pearson Education, 2008.
- 2) Data Mining Techniques - Arun K Pujari, University Press.
- 3) Enterprise Resource Planning 1/e - Alexis Leon, International edition-Tata McGraw Hill publication.
- 4) Concepts in computing - Kenneth Hoganson, First Indian Edition, Jones & Bartlett Publishers, Inc., 2010.
- 5) Artificial Intelligence - Elaine Rich, Kevin Knight, 2nd edition, McGraw Hill, 1991.
- 6) Computer Networks - Andrew S. Tanenbaum, 4<sup>th</sup> Edition, Pearson Education.