Syllabus of BCA Part - III 2024-25 Onwards

Code	Subject	Course	Hours / Week	Max. Marks
	Theory			
BCA-301	Java Programming	CCC	4	100
BCA-302	Python Programming	CCC	4	100
BCA-303	Data Communication & Computer Networks	CCC	4	100
BCA-304	Artificial Intelligence	CCC	4	100
BCA-305	Digital Marketing	CCC	4	100
	Elective-III	ECC	4	
	Practical			
BCA-307	Java Lab	CCC	3	100
BCA-308	Python Lab	CCC	3	100
BCA-309	Digital Marketing Lab	ECC	3	100
BCA-310	Project	CCC	3	100
	Elective Group-I (Any One)			
BCA-C01	Data Warehousing and Data Mining	ECC	4	
BCA-C02	Network Security & Cryptography	ECC	4	
BCA-C03	Machine Learning	ECC	4	

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BCA 301: Java Programming

Question Paper pattern for Main University Examination   *Max Marks: 100*

Part – I (very short answer) consists 10 questions of two marks each with two questions from each unit. Maximum limit for each question is up to 40 words.
Part – II (short answer) consists 5 questions of **four marks** each with one question from each unit. Maximum limit for each question is up to 80 words.
Part – III (Long answer) consists 5 questions of **twelve marks** each with one question from each unit with internal choice.

UNIT – I

Java Programming : Basic concepts of object oriented programming(Objects and Classes, Data Abstraction & Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message passing). Java features, JVM, Byte code interpretation, simple java program, command line argument. Data types, type casting, operators (Arithmetic, increment, decrement, relational, logical, bit wise, conditional) and expressions.

UNIT – II

Decision Making and Branching : Decision making and branching (if...else, else if, switch), looping, classes, objects and methods, constructors, wrapper classes, nesting of methods, overriding methods, final class, visibility control, Arrays, strings.

UNIT – III

Inheritance & Multithreaded Programming : Inheritance, Types of Inheritance, Abstract class, interfaces, packages, multithreaded programming, extending thread, life cycle of thread, using thread methods, thread priority, synchronization.

UNIT – IV

Exception Handling : Exception-Handling fundamentals, Exception types, try, catch, throw, finally, creating exception sub classes.
AWT controls (Button, Labels, Combo box, list and other Listeners), Layout and component managers, Event handling, string handling (only main functions), graphic programming (line, rectangles, circle, and ellipses).

UNIT – V

Overview of Networking in Java : URL class and its usage through connection, Sockets based connectivity, TCP/IP Sockets and server sockets, Datagram Sockets. Introduction to Java Beans BDK, JAR files, Servlets Life cycle of servlet, JDBC connectivity.

Recommended Text Books

1. Mastering java 2 ", BPB Publications. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2nd
3. The complete reference JAVA2, Herbert schildt. TMH
4. Arnold,Gosling, " The Java Programming Professional 2000", Addison Wesley Publication
5. C.Thomas wu, "An introduction to oop with Java", TMH

BCA-302: Python Programming

UNIT-I

Python Concepts: Origin, Comparison, Comments, Variables and Assignment, Identifiers, Basic Style Guidelines, Standard Types, Internal Types, Operators, Built-in Functions, Numbers and Strings. Sequences: Strings, Sequences, String-Operators & functions, Special Features of Strings, Memory Management, programs & examples.

Conditionals and Loops: if statement, else Statement, elif Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement

Unit-II

Object and Classes: Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, Class variables, Inheritance, Polymorphism, Type Identification, Python libraries(Strings, Data structures & algorithms).

Lists and Sets: Built-in Functions, List type built in Methods. Tuples, Tuple Operators, Special Features of Tuples, Set: Introduction, Accessing, Built-in Methods (Add, Update, Clear, Copy, Discard, Remove), Operations (Union, Intersection, Difference).

Unit-III

Dictionaries : Introduction to Dictionaries, Built-in Functions, Built-in Methods, Dictionary Keys, Sorting and Looping, Nested Dictionaries.

Files: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules.

Unit-IV

Regular Expression: Regular Expression: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python.

Excetiptons: Concepts of Exceptions, Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

Unit-V

Database Interaction : SQL Database Connection using Python, Creating and Searching Tables, Reading and storing config information on database, Programming using database connections, **Python Multithreading**: Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading.

Recommended Books:

1. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2nd Edition, 2018
2. Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, "Python Programming", Notion Press, 1st Edition, 2020
3. Martin C. Brown, "The Complete Reference Python", McGraw Hill Education, 4th Edition, 2021.
4. Ashok Namdev Kamthane, "Programming and Problem Solving with Python", 2nd Edn, MGH, 2020
5. Allen B. Downey, "Think Python", O'Reilly Media, 2016
6. SakisKasampalis, Quan Nguyen, Dr Gabriele Lanaro, Ingram, "Advanced Python Programming", short title, 2019
7. David M. Beazley, "Python Essential Reference", Amazon Books, 2010.
8. M. Lutz, "Programming Python, 4th Edition", O'Reilly Media, 2010

BCA 303: Data Communication & Computer Networks

Question Paper pattern for Main University Examination   *Max Marks: 100*

Part – I (very short answer) consists 10 questions of **two marks** each with two questions from each unit. Maximum limit for each question is up to 40 words.
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Part – III (Long answer) consists 5 questions of **twelve marks** each with one question from each unit with internal choice.

UNIT-I

Introduction: Network definition, Network topologies, Types of Network, Layered network architecture, Categories of Network, protocol, Standards and interface.

Network Models : OSI reference model, OSI model architecture and functions of layers, TCP/IP protocol suite.

UNIT-II

Data Communication Fundamentals and Techniques: Analog and digital signal, Data-rate limits, Digital to digital line encoding schemes, Pulse code modulation, Digital to analog modulation- ASK, FSK, PSK, QAM, multiplexing techniques- FDM, TDM, WDM, transmission modes

Transmission Media : Guided media (Twisted Pair Cable, Coaxial Cable & Fiber-Optic Cable) and Unguided media: Radio wave, Infrared, Microwave Communication, Satellite, Geosynchronous Satellites Communication.

UNIT-III

Networks Switching Techniques: Circuit switching; Packet switching- Connectionless datagram switching, Connection-oriented virtual circuit switching.

Data Link Layer Functions and Protocol: Error detection and error correction techniques, Data-link control- framing and flow control, Error recovery protocols- Stop and wait ARQ, Go-back-n ARQ, Selective repeat ARQ, Point to Point Protocol on Internet.

UNIT-IV

Access mechanisms Multiple Access Protocol and Networks: ALOHA,CSMA/CD protocols, Ethernet LANS, connecting LAN and back-bone networks- Repeaters, Hubs, Switches, Bridges, Router and Gateways.

Networks Layer Functions and Protocols: Routing, Routing algorithms, Network layer protocol of Internet- IP protocol, Internet control protocols.

UNIT-V

Transport Layer Functions and Protocols: Transport services, Berkeley socket interface overview, Transport layer protocol of Internet- UDP and TCP. Overview of Application layer protocol, DNS protocol, WWW & HTTP protocols.

Recommended Books :
1. Behrouz A. Forouzan, "Data Communication and Networking", 4th edition, Tata McGraw Hill, 2006.
2. A. S. Tanenbaum, "Computer Networks", Pearson Education Asia, 4th Ed., 2003.
3. William Stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002.

BCA 304: Artificial Intelligence

Question Paper pattern for Main University Examination   *Max Marks: 100*

Part – I (very short answer) consists 10 questions of **two marks** each with two questions from each unit. Maximum limit for each question is up to 40 words.
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Part – III (Long answer) consists 5 questions of **twelve marks** each with one question from each unit with internal choice.

UNIT – I

General Issues and overview of AI : Concept of Intelligence, Definition of AI AI intelligent agents: Agents and Environments, Characteristics of AI, Comparison of AI, Machine Learning and Deep Learning, Defining problem as a State Space Search, Search and Control Strategies, Production systems, Problems – Water Jug problem, Missionary Cannibal Problem, Block words Problem, Monkey & Banana problem, Applications of AI.

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Unit-II

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Informed search strategies (Heuristic search) Generate-and-test, Hill climbing, Best First Search , Constraint Satisfaction ,A*, AO* Algorithms, Problem reduction, Game Playing-Adversial search, Problem in Game playing.

Unit-III

Knowledge Representation : Definition of Knowledge, Types of knowledge (Procedural and Declarative knowledge),Approaches to Knowledge Representation, Knowledge representation using Propositional and Predicate logic , Conversion to clause form. Resolution in Propositional logic, Resolution in Predicate logic, Introduction to LISP & PROLOG.
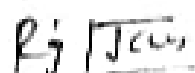
Unit-IV

Natural Language Processing: Origins and challenges of NLP , Goals of NLP, Steps of Natural Language Processing , Discourse Knowledge, Pragmatic Knowledge, The Chomsky Hierarchy of Grammars, Transformational Grammar, Case Grammars (FILLMORE's Grammar), Semantic Grammars, Context Free Grammar (CFG), Parsing Process. types of parsing, Transition Network: types of Transition Network , Applications of NLP, Case Studies: Eliza System, Lunar System

Unit-V

Introduction to Expert Systems: Definition , characteristics of an expert system .The development process of Expert System, Structure of Expert Systems, Human Expert Vs Expert System, types of expert systems ,Shells of Expert System , Benefits of Expert System, Limitations of Expert System, Applications of expert System ,Case Studies : MYCIN, DENDRAL

Recommended Books:
1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill, 3rd edition, 2012.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, 1st edition, 2012
3. Winston, Patrick, Henry, "Artificial Intelligence", Pearson Education, 3rd edition, 2014
4. Subhasree Bhattacharjee, "Artificial Intelligence for Student" Shroff Publishers and Distributors Pvt.LTD., 1st Edition, 2016
5. Steven Bird, Ewan Klein and Edward Loper, Natural Language Processing with PythonII, First Edition, OReilly Media, 2009.
6. Nils J. Nilsson, "Principles of Artificial Intelligence (Symbolic Computation / Artificial Intelligence)", reprint edition, 2014.
7. Stuart Russell, Peter Norving, "Artificial Intelligence: A Modern Approach", Pearson Education, 3rd edition, 2010.

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BCA-305 : Digital Marketing

Question Paper pattern for Main University Examination   *Max Marks: 100*

Part – I (very short answer) consists 10 questions of **two marks** each with two questions from each unit. Maximum limit for each question is up to 40 words.

Part – II (short answer) consists 5 questions of **four marks** each with one question from each unit. Maximum limit for each question is up to 80 words.

Part – III (Long answer) consists 5 questions of **twelve marks** each with one question from each unit with internal choice.

Unit-I

Digital Marketing Fundamentals : Define digital marketing, Importance, Marketing v/s Sales, Marketing Mix and 4 Ps, Digital Marketing, CRM platform, CRM models. CRM platform, Marketing Automation, Inbound vs Outbound Marketing, Content Marketing. Understanding Traffic, Understanding Leads, Strategic Flow for Marketing Activities

Unit-II

Website Planning and Structure : WWW, Domains, Buying a Domain, Website Language & Technology, Core Objective of Website and Flow, One Page Website, Google Analytics, Tracking Code, Website Auditing.

Search Engine Optimization: Basic Concepts of SEO, Search Engine working, Keywords, titles, meta tags, Understating the SERP, Google processing, Indexing, Crawling, On page optimization techniques, Off page Optimization techniques, Web 2.0 Submission, Article Submission, Image Submission, Video Submission, SEO Audit & Future of SEO.

Unit-III

Email Marketing: Content Writing, Email Machine – The Strategy, Email Frequency, Triggers in Email using 4Ps, Sequence of Email Triggers, Email Software and Tools. Importing Email Lists, Planning Email Campaign, Email Templates and Designs, Sending HTML Email Campaigns, WebForms Lead Importing, Integrating Landing Page Forms Campaign Reports and Insights, Segmentation Strategy Segmentation, Lists Auto-Responder Series Triggering Auto – Responder Emails

Unit-IV

Google Adwords : Basics, Google Ad Types, Pricing Models, PPC Cost Formula, Ad Page Rank, Billing and Payments, Adwords User Interface, Keyword Planning, Keywords Control, Creating Ad Campaigns, Creating Text Ads, Creating Ad Groups, Bidding Strategy for CPC.

Unit-V

Social Media Optimization (SMO) : Introduction Social Media Optimization. Introduction to Social Media networks, Types of Social media Websites, Social Media Optimization Concept, Facebook, Google+, LinkedIn, YouTube, Pinterest, Hashtags, image optimization

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Social Media Marketing (SMM) :Facebook Optimization, Fan Page Vs profile Vs Group, Creating Facebook page for Business, Increasing fans and Doing Marketing. Facebook Analytics, Facebook Advertising and Its types, Creating Advertising Campaigns, Payment modes, Introduction to Twitter, Creating Strong profiles on twitter.

Recommended Books:

1. Ian Dodson, "The Art of Digital Marketing ", Wiley, 2018
2. Seema Gupta, "Digital Marketing" Mc-Graw Hill, I" Edition, 2017
3. **References:** Puneet Singh Bhatia, "Fundamentals of Digital Marketing", Pearson, I" Edition, 2017
4. Vandana Ahuja, "Digital Marketing", Oxford University Press
5. Philip Kotler, "Marketing 4.0 – Moving from Traditional to Digital", Wiley, 2017

Elective Theory papers for Elective Group-III of BCA Part-III

BCA-C01: Data Warehousing and Data Mining

Question Paper pattern for Main University Examination   *Max Marks: 100*

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Part – III (Long answer) consists 5 questions of **twelve marks** each with one question from each unit with internal choice.

Unit-I

Introduction to Data Warehousing : Data Warehouse definition, Characteristics, Purpose of Data Warehouse and functions, Data warehouse Architecture, Components, Building a Data warehouse, Implementation.

Unit-II

Data Mining : Data Warehousing to Data Mining, Evolution Analysis, Classification of Data Mining Systems, Architecture of data mining system, Major Issues in Data Mining.

Patterns and models – Data visualization principles, Data Mining functionalities, Major issues in Data Mining.

Unit-III

Data preprocessing : Needs, Data Cleaning, Data Integration and Transformation, Data Reduction, Dieselization and Concept Hierarchy Generation; Analysis of Attributes Relevance, Discriminating between Different Classes.

Data Marts: Data Warehouse Cost-Benefit Analysis/Return on Investment and OLAP Technology for Data Mining.

Unit-IV

Association Rules : Association Rule Mining, Single- Dimensional Boolean Association Rules from Transactional Databases. Apriori algorithm, Use of sampling for frequent item-set, FP tree algorithm, Multi-Level Association Rules from Transaction Databases.

Unit- V

Clustering and Applications of Data Mining : Cluster Analysis, Types of Data Categorization of Major Clustering Methods (Kmeans, Partitioning Methods, Density Based Methods, Grid Based Methods, Model-Based Clustering Methods), Data Mining Applications.

Recommended Books :

Data Warehousing in the Real World – SAM ANAHORY & Dennis MURRAY, Peasrson Edn Asia.

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Data Mining – Concepts and Techniques- JIA WEI HAN & MICHELINE
KAMBER Hareourt India.

Data Warehousing ; Reema Thareja; Oxford

Data Mining Introductory and advanced topics MARGARET H DUNHAM
PEARSON EDUCATION.

Data Warehousing in Real World Anuhory, Pearson Education.

Data Mining Techniques- ARUN K PUJARI, University Press.

Buiding the Data Warehouse- W. H. Inmon, 3rd Edition, Wiley, 2003.

Data Warehousing Fundamentals- PAULRAJ PONNAIAH WILLEY
STUDENT EDN.

BCA C02: Network Security & Cryptography

Question Paper pattern for Main University Examination   *Max Marks: 100*

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Maximum limit for each question is up to 40 words.

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Maximum limit for each question is up to 80 words.

Part – III (Long answer) consists 5 questions of twelve marks each with one question from each unit
with internal choice.

Unit – I

Introduction to Security Attacks : Cryptography, Security Attacks, Security Services
and Mechanism.

Classical Encryption Techniques : Classical Techniques, Conventional Encryption
Model, Classical Encryption Techniques.

Unit - II

Modern Techniques: Simplified DES, Block Ciphers Principles. DES Standards. DES
Strength. Differential & Linear Cryptanalysis, Block Cipher Design Principles. Block
cipher Modes of Operation.

Conventional Encryption Algorithms: Triples DES, International Data Encryption
Algorithm. RC5, RC2 placement & Encryption Function. Key Distribution. Random
Number generation, Placement of Encryption Function.

Unit - III

Public Key Encryption: Public Key Cryptography: Principle of public key
Cryptosystems. RSA algorithm. Key Management. Fermat's Theorem & Euler's
Theorem.

Message Authentication & Hash Function: Authentication Requirements.
Authentication Function, Message Authentication Codes, Hash Function. Birthday
Attacks, Security of Hash Function & MAC's, MD5 Message Digest algorithm. Secure
Hash Algorithm(SHA).

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Unit - IV

Digital Signatures: RSA Based, ElGamal Signatures, Undeniable Signatures. **Authentication:** Model of Authentication Systems, Impersonation, Substitution and spoofing games, Authentication schemes for mutual authentication based on shared secret, two-way public key, one-way public key, Mediated Authentication, One way Authentication.

Unit - V

Network and System Security: Authentication Application- Kerberos x.509, Dictionary Authentication Services, Electronic Mail Security, Pretty Good Privacy (PGP), S/mime. Security: Architecture, Authentication Header, Encapsulation security payloads, combining security association, Key Management.

Web Security: Secure socket layer & Transport layer security, Secure electronic transaction (SET), System Security: Intruders, viruses, firewall Design principle, Trusted Systems.

Reference Books:

William Stalling; Cryptography and Network Security, Fifth Edn, Pearson 2006.
2. Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed.,PHI/Pearson.
Atul Kahate; Cryptography and network Security; Tata McgrawHill.
V.K. Pachghare; Cryptography and Information Security; PHI.
Matt Bishop, Sathyanarayana; Introduction to Computer Security;Pearson.

BCA C03: Machine Learning

Question Paper pattern for Main University Examination   *Max Marks: 100*

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Unit-I

Concepts : Machine Learning, Machine Learning Foundations-Overview, Applications. Types of Machine Learning, Basic Concepts in Machine Learning – Examples of Machine Learning, Perspectives/Issues in Machine Learning, AI vs. Machine Learning.

Unit-II

Supervised Learning : Introduction, Linear Models of Classification – Decision Trees, Naïve Bayes Classification, Linear Regression – Logistic Regression – Bayesian Logistic

Regression – Probabilistic Models Neural Network-Feed Forward Network Functions – Error Back Propagation – Regularization .

Unit-III

Unsupervised Learning : Clustering, Association rule mining, K-Means Clustering, EM (Expectation Maximization), Mixtures of Gaussians, EM algorithm in General, The Curse of Dimensionality, Dimensionality Reduction, Factor Analysis, Principal Component Analysis.

Unit-IV

Probabilistic Graphical Models : Directed Graphical Models, Bayesian Networks. Exploiting Independence Properties, From Distributions to Graphs, Examples – Markov Random Fields – Inference In Graphical Models – Learning - Naïve Bayes Classifiers - Markov Models – Hidden Markov Models.

Unit-V

Advanced Learning : Sampling – Basic Sampling Method – Monte Carlo, Reinforcement Learning-The Learning Task, Instance based Learning-Nearest neighbor classification, k-nearest neighbor, Elements of Reinforcement Learning, Difference between Reinforcement Learning and Supervised Learning, Applications of Reinforcement Learning.

Recommended Books:
1. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer 2006
2. EthemAlpaydin, "Introduction to Machine Learning", Prentice Hall of India, 2005
3. S.Sridhar, M.Vijayalakshmi, "Machine Learning", Oxford Publication,2021.
4. Joel Grus, "Data Science from Scratch- First Principles with Python", O'Reilly, 2015
5. Tom Mitchell, " Machine Learning", McGraw-Hill, 1997
6. Stephen MarsLand, "Machine Learning-An Algorithmic Perspective", CRC Press, 2009
7. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012
8. M. Gopal, "Applied MACHINE LEARNING", McGraw-Hill, 2018
9. Dr.Mahaveer Kumar Sain, "Introduction to Machine Learning", Akinik Publications-New Delhi, 2021.
10. Mark Summerfield, "Programming in Python 3: A Complete Introduction to the Python Language", Addison Wesley, 2010

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