

# UNIVERSITY OF LUCKNOW

## STUDY AND EVALUATION SCHEME

### BACHELOR OF COMPUTER APPLICATION

#### YEAR: THIRD, SEMESTER –V

Sl. No	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
			L	T	P	Sessional Exam			Exam. ESE		
						CT	TA	Total			
1	BCA-501	Data Communication and Computer Network	3	1	0	20	10	30	70	100	4
2	BCA-502	Design and Analysis of Algorithm	3	1	0	20	10	30	70	100	4
3	BCA-503	Web design Concept	3	0	0	20	10	30	70	100	3
4	BCA-504	UNIX and Shell Programming	3	1	0	20	10	30	70	100	4
5	BCA-505X	Elective-I	3	0	0	20	10	30	70	100	3
<b>PRACTICALS</b>											
6	BCA-506P	UNIX Lab	0	0	2	10	10	20	30	50	1
7	BCA-507P	Web Design lab	0	0	3	10	10	20	30	50	2
8	BCA-508P	Viva-Voce on Summer Training	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

#### Elective-I

- |             |   |
|-------------|---|
| 1. BCA-5051 | Data Mining and Ware Housing                          |
| 2. BCA-5052 | Software Testing Methodology                          |
| 3. BCA-5053 | Open Source Software                                  |
| 4. BCA-5054 | Information System: Analysis, Design & Implementation |

# UNIVERSITY OF LUCKNOW

## STUDY AND EVALUATION SCHEME

### BACHELOR OF COMPUTER APPLICATION

#### YEAR: THIRD, SEMESTER –VI

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
			L	T	P	Sessional Exam			Exam. ESE		
						CT	TA	Total			
1	BCA-601	E-Commerce	3	1	0	20	10	30	70	100	4
2	BCA-602	Cyber Law and Internet Security	3	1	0	20	10	30	70	100	4
3	BCA-603	Mobile Computing	3	0	0	20	10	30	70	100	3
4	BCA-604X	Elective-II	3	1	0	20	10	30	70	100	4
<b>PRACTICAL/PROJECT</b>											
5	BCA-605P	Advanced Technology ( Dot Net) Lab	0	0	3	10	10	20	30	50	2
6	BCA-Pro	Project	0	0	6	-	50	50	150	200	5
7	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	<b>12</b>	<b>3</b>	<b>9</b>					<b>700</b>	<b>22</b>

#### Elective-II

- |             |                         |
|-------------|-------------------------|
| 1. BCA-6041 | Optimization Techniques |
| 2. BCA-6042 | Microprocessor          |
| 3. BCA-6043 | Data Compression        |
| 4. BCA-6044 | Cryptography            |

**BCA-501**  
**Data Communication and Computer Network**

**L T P**  
**3 1 0**

**Unit-1**

**08**

**Introduction Concepts:** Goals and applications of networks, network structure and architecture, the OSI reference model, services, network topology design, delay analysis, back bone design, local access network design, physical layer transmission media, switching methods, ISDN, and terminal handling.

**Unit-2**

**12**

**Medium Access Sub Layer:** Medium access sub layer - channel allocations, LAN protocols - aloha protocols - overview of IEEE standards - FDDI.

**Data Link Layer:** Elementary data link protocols, sliding window protocols, and error handling.

**Unit-3**

**12**

**Network Layer:** Point - to point Networks, routing, congestion control Internetworking -TCP /IP, IP packet, IP address, and IPv6.

**Transport Layer:** Transport layer - design issues, and connection management.

**Unit-4**

**08**

**Session Layer:** Design issues and remote procedure call.

**Presentation Layer:** Design issues.

**Application Layer:** File transfer, access and management, electronic mail, virtual terminals, other application. Example networks - internet and public networks.

**Text Books:**

1. Forouzen, "Data Communication and Networking", TMH.
2. A.S. Tanenbaum, "Computer Networks", Pearson Education.
3. W. Stallings, "Data and Computer Communication", Macmillan Press.

**Reference Books:**

1. Anuranjan Misra, "Computer Networks", Acme Learning
2. G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media.
3. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher.

**BCA-502**  
**Design and Analysis of Algorithm**

**L T P**  
**3 1 0**

**Unit-1** **08**

**Introduction:** Algorithms, analyzing algorithms, complexity of algorithms, growth of functions, performance measurements, sorting and order statistics - shell sort, quick sort, merge sort, heap sort, comparison of sorting algorithms, and sorting in linear time.

**Unit-2** **12**

**Advanced Data Structures:** Red-Black trees, B – trees, Binomial Heaps, Fibonacci Heaps. Divide and Conquer Sorting, Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Single source shortest paths - Dijkstra’s and Bellman Ford algorithms.

**Unit-3** **12**

**Dynamic Programming:** Knapsack, all pair shortest paths – Warshal’s and Floyd’s algorithms, resource allocation problem. Backtracking, branch and bound, graph coloring, n-queen problem, Hamiltonian cycles, and sum of subsets.

**Unit-4** **08**

**Selected Topics:** Algebraic computation, fast Fourier transform, string matching, theory of NP-completeness, approximation algorithms, and randomized algorithms.

**Text Books:**

1. Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Printice Hall of India.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", Galgotia Press.
3. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education.

**Reference Books:**

1. Jon Kleinberg and Éva Tardos, “Algorithm Design”, Pearson.
2. Michael T Goodrich and Roberto Tamassia, “Algorithm Design: Foundations, Analysis, and Internet Examples”, Wiley.
3. Harry R. Lewis and Larry Denenberg, “Data Structures and Their Algorithms”, Harper Collins.

**BCA–503**  
**Web Design Concept**

**L T P**  
**3 0 0**

**Unit-1**

**12**

**Introduction:** Introduction and web development strategies, history of web and internet, protocols governing web, introduction to client-server computing, web applications, web project, and web team.

**Unit-2**

**08**

**Web Page Designing:** HTML: List, table, images, frames, forms, CSS, document type definition, object Models, presenting and using XML, **XML Processors:** DOM and SAX, and dynamic HTML.

**Unit-3**

**10**

**Java script:** Introduction, documents, forms, statements, functions, objects, introduction to AJAX, and VB script.

**Unit-4**

**10**

**Server Site Programming:** Introduction to active server pages (ASP), introduction to Java Server Page (JSP), JSP application design, JSP objects, conditional processing, declaring variables and methods, sharing data between JSP pages.

**Text Books:**

1. Burdman, Jessica, “Collaborative Web Development” Addison Wesley.
2. Xavier, “Web Technology and Design”, New Age International.
3. Ivan Bayross, “HTML, DHTML, Java Script, Perl & CGI”, BPB Publication.

**Reference Books:**

1. Ramesh Bangia, “Internet and Web Design”, New Age International.
2. Deitel, “Java for programmers”, Pearson Education.
3. Uttam k. Roy, “Web Technologies”, Oxford.

**BCA-504**  
**UNIX and Shell Programming**

**L T P**  
**3 1 0**

**Unit-1** **08**

**UNIX Architecture:** The UNIX operating system, LINUX and gnu. The UNIX architecture, features of UNIX, POSIX and single UNIX specification, internal and external commands, command structure, man browsing and manual pages on-line.

**The file system:** The parent – child relationship, the home variable, pwd, cd, mkdir, absolute pathname, and relative pathname.

**Unit-2** **10**

**Basic File Attributes:** Listing directory contents, the UNIX file system, ls -l, -d option, file ownership, file permissions, chmod, directory permissions, changing file ownership, file attributes.

**The Process:** Process basics, process status, system processes (-e or -a), mechanism of process creation, process states and zombies, and running jobs in background.

**Unit-3** **10**

**Simple Filters:** pr, head, tail, cut, paste, sort, uniq, tr.

**Filters using regular expressions – grep and sed:** grep, Basic Regular Expressions (BRE), Extended Regular Expressions (ERE) and egrep, the stream editor, and line addressing using multiple instructions (-E and -F) context addressing.

**Unit-4** **12**

**The Shell:** The shell's interpretive cycle, shell offerings, pattern matching, escaping and quoting, redirection, pipes, tee, command substitution, shell variables, and essential shell programming.

**Text Books:**

1. Sumitabha Das, "UNIX – Concepts and Applications", Tata McGraw Hill.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Unix and shell Programming", Thomson Learning.
3. Neil Matthew and Richard Stones, "Beginning Linux Programming", Wrox.

**Reference Books:**

1. Kernighan and Pike, "Unix programming environment", Pearson Education.
2. Rosen, Host, Klee, Farber, Rosinski, "The Complete Reference Unix", TMH.
3. Yashavant P. Kanetkar, "Unix Shell Programming", BPB Publications.

**BCA-5051**  
**Data Mining and Data Warehousing**

**L T P**  
**3 0 0**

**Unit-1** **08**

**Introduction:** Data mining-definition & functionalities, data processing, form of data pre-processing, data cleaning: missing values, noisy data, binning, clustering, regression, inconsistent data, data integration and transformation, and data reduction.

**Unit-2** **12**

**Concept Description:** Association rule mining, mining single-dimensional Boolean association rules from transactional databases, Apriori Algorithm, **Classification and Predictions:** Decision tree, Bayesian Classification, and K-nearest neighbour classifiers.

**Unit-3** **08**

**Data Warehousing:** Overview, definition, delivery process, difference between database system and data warehouse, multi-dimensional data model, data cubes, stars, snowflakes, fact constellations, concept hierarchy, process architecture, 3 tier architecture, and data marting.

**Unit-4** **12**

**OLAP:** Aggregation, historical information, query facility, OLAP function and tools. OLAP servers, ROLAP, MOLAP, HOLAP, data mining interface, security, backup and recovery.

**Text Books:**

1. M. H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
2. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques", Elsevier.
3. Ian H. Witten, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann

**Reference Books:**

1. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems", Pearson Education.
2. Mallach, "Data Warehousing System", McGraw –Hill.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining, & OLAP", Tata McGraw-Hill Education.

**BCA-5052**  
**Software Testing Methodology**

**L T P**  
**3 0 0**

**Unit-1** **10**

**Introduction:** Principles of software testing, error, fault, failure, incident, error and fault taxonomies, test cases, limitations of testing, code inspections, desk checking, group walkthroughs and peer reviews and overview of graph theory for testers.

**Unit-2** **10**

**Functional Testing:** Boundary value analysis, equivalence class testing, decision table-based testing, cause effect graphing technique.

**Structural Testing:** Path testing, DD-paths, cyclomatic complexity, graph metrics, data flow testing and slice-based testing.

**Unit-3** **08**

**Testing Activities:** Unit testing, levels of testing, integration testing, system testing, debugging, regression testing and extreme testing.

**Unit-4** **12**

**Object Oriented Testing:** Issues in object-oriented testing, class testing, GUI testing, object-oriented integration and system testing. Testing internet applications: overview and challenges and strategies of testing internet applications.

**Text Books:**

1. Paul Ammann and Jeff Offutt, "Introduction to Software Testing", Cambridge University Press, Cambridge, UK.
2. Mauro Pezze, Michal Young, "Software Testing and Analysis: Process, Principles and Techniques", Wiley India.
3. Yogesh Singh, "Software Testing", Cambridge University Press, New York.

**Reference Books:**

1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Van Nostrand Reinhold, New York.
3. Boris Beizer, "Software Testing Techniques", Van Nostrand Reinhold, New York.



**BCA-5053**  
**Open Source Software**

**L T P**  
**3 0 0**

**Unit-1** **08**

**Introduction-** Introduction to open sources, need of open sources, advantages of open sources and application of open sources.

**Unit-2** **12**

**Open Source Operating Systems: LINUX-** Introduction, general overview, kernel mode and user mode, process, advanced concepts, scheduling, personalities, cloning and signals.

**Unit-3** **08**

**Open Source Database: MySQL-** Introduction - setting up account-starting, terminating and writing your own SQI programs, record selection technology, working with strings - date and time, sorting query results.

**Unit-4** **12**

**Open Source Programming Languages: PHP-** Introduction - programming in web environment, variables, constants, datatypes, operators, statements, functions, arrays and OOP - string manipulation and regular expression.

**Perl:** Perl backgrounder, Perl overview, Perl parsing rules, variables and data -statements and control structures, subroutines, packages, and modules- working with files and data manipulation.

**Text Books:**

1. Martin C. Brown, "Perl: The Complete Reference", Tata McGraw-Hill Publishing Company Limited, Indian Reprint
2. Vikram Vaswani, "MYSQL: The Complete Reference", Tata McGraw -Hill Publishing Company Limited, Indian Reprint.
3. Paul Kavanagh, "Open Source Software: Implementation and Management", Elsevier.

**Reference Books:**

1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly.
2. Wesley J. Chun, "Core Python Programming", Prentice Hall.
3. Steven Holzner, "PHP: The Complete Reference", Tata McGraw-Hill Publishing Company Limited, Indian Reprint.

**BCA-5054**  
**Information System: Analysis and Design & Implementation**

**L T P**  
**3 0 0**

**Unit-1**

**12**

**Basic Concept of Systems:** The system: definition and concepts, elements of a system: input, output processor, control, feedback, environment, boundaries and interface, characteristics of a system, types of systems -physical and abstract system, open and closed systems, man-made systems, information and its categories.

**Information systems:** TPS, OAS, MIS, DSS, ESS; **System analyst:** role and need of system analyst and system analyst as an agent of change.

**Unit-2**

**08**

**System Development Life Cycle:** Introduction to SDLC. Various phases: study, analysis, design, development, testing, implementation, and maintenance.

**System documentation:** Types of documentation and their importance.

**Unit-3**

**10**

**Tools for System Analysis:** Data flow diagram (DFD), logical and physical DFDs, developing DFD, system flowcharts and structured charts, structured English, decision trees and decision tables.

**System design module specifications:** Module coupling and cohesion, top-down and bottom-up design, logical and physical design and structured design.

**Unit-4**

**10**

**System Implementation and Maintenance:** Need of system testing, types of system testing, quality assurance; system conversion, conversion methods, procedures and controls, system evaluation and performance.

**Text Books:**

1. Perry Edwards, "System Analysis & design", Mc Graw Hill Publication.
2. Jeffrey A. Hofer Joey F. George Joseph S. Valacich, "Modern System Analysis and Design", Addison Weseley.
3. Shouhong Wang, "Information Systems Analysis and Design", Universal-Publisher Boca Raton.

**Reference Books:**

1. Elias m. Awad, "System Analysis and Design", Galgotia Publications Pvt. Ltd.
2. Henry C. Lucas, "Analysis, Design and Implementation of Information Systems", McGraw-Hill Education.
3. Whitten, Bentaly and Barlow, "System Analysis and Design Methods", Galgotia Publication.

1. Execute the following list of basic commands in UNIX:
  - (i) pwd (ii) mkdir (iii) cd
2. Execute the following list of basic commands in UNIX:
  - (i) who (ii) echo (iii) cat
2. Execute the following list of basic commands in UNIX:
  - (i) rm (ii) mv (iii) wc (iv) cp
4. Execute the basic file attributes with all possible options:
  - (i) ls (ii) chmod
5. Execute basic commands using vi editor:
  - a. input mode commands
  - b. saving text and quitting
6. Execute basic commands using vi editor
  - a. navigation
  - b. editing text
  - c. searching pattern
7. Execute the following filters using regular expressions with all possible options:
  - (i) grep (ii) sed
8. Write a shell script to display current date and calendar.

**BCA-507P**  
**Web Design Lab**

**L T P**  
**0 0 3**

1. HTML program to create resume preparation using tables.
2. HTML program for home page creation using frames.
3. HTML program for form creation.
4. Create a web page to embed an image map in a web page using HTML.
5. Create a web page to get the coordinates from an image using java script.
6. Create a web page with all types of cascading style sheets.
7. Write HTML/Java scripts to display your CV in navigator, your institute website, Department website and tutorial website for specific subject.
8. Design HTML form for keeping student record and validate it using Java script.
9. Writing program in XML for creation of DTD, which specifies set of rules.
10. Create a style sheet in CSS/ XSL & display the document in internet explorer.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

**BCA-601**  
**E-Commerce**

**L T P**  
**3 1 0**

**Unit-1** **12**

**Introduction:** What is E-commerce, forces behind E-commerce industry framework, brief history of ecommerce, inter organizational E-commerce intra organizational E-commerce, and consumer to business electronic commerce, architectural framework.

**Unit-2** **08**

**Mobile Commerce:** Introduction to mobile commerce, mobile computing application, wireless application protocols, WAP technology, mobile information devices, web security introduction to web security, firewalls & transaction security, client server network, emerging client server security threats, firewalls and network security.

**Unit-3** **08**

**Encryption:** World wide web & security, encryption, transaction security, secret key encryption, public key encryption, virtual private network (VPN) and implementation management issues.

**Unit-4** **12**

**Electronic Payments:** Overview of electronics payments, digital token-based electronics payment system, smart cards, credit card I debit card-based EPS, emerging financial instruments, and online banking.

**Text Books:**

1. Greenstein and Feinman, "E-Commerce", TMH.
2. Ravi Kalakota, Andrew Whinston, "Frontiers of Electronic Commerce", Addison Wesley.
3. Pete Lohsin , John Vacca "Electronic Commerce", New Age.

**Reference Books:**

1. Denieal Amor, "The E-Business Revolution", Addison Wesley.
2. Diwan, Sharma, "E-Commerce", Excel.
3. Bajaj & Nag, "E-Commerce: The Cutting Edge of Business", TMH.

**BCA-602**  
**Cyber Law and Internet Security**

**L T P**  
**3 1 0**

**Unit-1** **12**

**Cyber Space Jurisdiction:** Jurisdiction issues under IT Act, 2000, traditional principals of jurisdiction, extra-terrestrial jurisdiction and case laws on cyber space jurisdiction.

**E-commerce and Laws in India:** Digital / Electronic signature in Indian laws, E-commerce; issues and provisions in Indian law, and E-Governance.

**Unit-2** **08**

**Intellectual Property Rights, Domain Names and Trademark Dispute:** Concept of trademarks in internet era, cybersquatting, reverse hijacking, jurisdiction in trademark disputes, copyright in the digital medium, and copyright in computer programs

**Unit-3** **10**

**Developing Secure Information Systems:** Information security governance & risk management, security architecture & design security issues in hardware, data storage & downloadable devices, physical security of IT assets, access control, CCTV and intrusion detection systems and backup security measures.

**Unit-4** **10**

**Security Policies:** Development of policies, WWW policies, email security policies, policy review process-corporate policies-sample security policies, publishing and notification requirement of the policies.

**Text Books:**

1. Prashant Mali, "Cyber Law & Cyber Crimes", Snow White publications, Mumbai.
2. Dr. Surya Prakash Tripathi, Ritendra Goyal and Praveen Kumar Shukla, "Introduction to Information Security and Cyber Law", Willey Dreamtech Press.
3. Sarika Gupta & Gaurav Gupta, "Information Security and Cyber Laws", Khanna Publishing House.

**Reference Books:**

1. Farooq Ahmad "Cyber Law in India", Pioneer Publications.
2. Vakul Sharma, "Information Technology Law and Practice", Universal Law Publishing Co. Pvt. Ltd.
3. Suresh T. Vishwanathan, "The Indian Cyber Law", Bharat Law House New Delhi.

**BCA-603**  
**Mobile Computing**

**L T P**  
**3 0 0**

**Unit-1** **10**  
**Introduction:** Issues in mobile computing, characteristics of mobile computing, structure of mobile computing and overview of wireless telephony: cellular concept.

**Unit-2** **10**  
**Evaluation of Mobile System and Wireless Network:** GSM, CDMA, FDMA, TDMA; **Wireless networking:** Wireless LAN overview, Bluetooth, wireless multiple access protocols, TCP over wireless, wireless applications, data broadcasting, mobile IP and WAP.

**Unit-3** **08**  
**Data management issues:** Management issues, hoarding techniques, data replication for mobile computers, adaptive clustering for mobile wireless networks and file system.

**Unit-4** **12**  
**Mobile Agents and Routing algorithms:** Mobile agent, security and fault tolerance, transaction processing in mobile computing environment, Mobile Adhoc Networks (MANETs), Routing protocols, Global State Routing (GSR), Destination Sequenced Distance Vector routing (DSDV) and Dynamic Source Routing (DSR) and Ad Hoc On-demand Distance Vector routing (AODV).

**Text Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley.
2. Raj Kamal, "Mobile Computing", Oxford University Press.
3. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing, Technology Applications and Service Creation", Mc Graw Hill.

**Reference Books:**

1. Charles Perkins, "Mobile IP", Addison Wesley.
2. Charles Perkins, "Ad hoc Networks", Addison Wesley.
3. Upadhyaya, "Mobile Computing", Springer.

**BCA-6041**  
**Optimization Techniques**

**L T P**  
**3 1 0**

**Unit-1** **10**

**Linear programming:** Central problem of linear programming various definitions included statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical method formulation and linear programming problem.

**Unit-2** **10**

**Queuing Theory:** Characteristics of queuing system, classification of queuing model single channel queuing theory and generalization of steady state m/m/1 queuing models (model-I, model-II).

**Unit-3** **08**

**Replacement Theory:** Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.

**Unit-4** **12**

**Inventory Theory:** Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite. **Job Sequencing:** Introduction, solution of sequencing problem, and Johnson's algorithm for n jobs through two machines.

**Text Books:**

1. S S Rao, "Engineering Optimization – Theory and Applications", New Age International (P) Ltd.
2. A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education.
3. Gupta V.G., "Optimization Theory Techniques of Operations Research", Oxford Book Company.

**Reference Books:**

1. Abidi Mongi A. "Optimization Techniques in Computer vision", Springer.
2. Falk Heiko, "Source Code Optimization Techniques for Data Flow Dominated Embedded Software", Springer Verlag New York.
3. Evtushenko Yuriy G. "Numerical Optimization Techniques", Springer Verlag New York.
4. Prakash Om, "Information Theory and Optimization Techniques in Scientific Research", VDM Verlag.



**BCA-6042**  
**Microprocessor**

**L T P**  
**3 1 0**

**Unit-1** **08**  
**Microprocessors:** Introduction, Advances in semiconductor technology, Organization of microprocessor-based system, and 8085 microprocessor.

**Unit-2** **10**  
**The 8085 MPU architecture:** 8085 bus organization, demultiplexing the bus AD7-AD0, generating control signals. ALU, timing and control unit, instruction register and decoder, register array, decoding and executing an instruction.

**Unit-3** **10**  
**8085 Machine:** Machine cycles and bus timings opcode fetch machine cycle, memory read machine cycle, memory k machine cycle, IO read machine cycle, IO write machine cycle and execution time of the instruction cycle.

**Unit-4** **12**  
**Counters and time delays:** Time delay using single register and register pair, Stack and subroutines, Call and return instructions, Advanced subroutine concept. Assembly language program Hexadecimal counter, Sum of odd and even numbers, Hex to BCD conversion and Interrupts.

**Text Books:**

1. Gaonkar, Ramesh S., "Microprocessor Architecture, Programming, and Applications with the 8085", Pen Ram International Publishing.
2. Ray, A.K. & Burchandi, "Advanced Microprocessors and Peripherals: Architecture Programming and Interfacing", Tata McGraw Hill.
3. B. Ram, "Fundamentals of microprocessor and microcontroller", Dhanpat Rai Publishing Co Pvt Ltd.

**Reference Books:**

1. Hall D.V, "Microprocessor and Interfacing", Tata McGraw Hill.
2. B.P. Singh & Renu Singh, "Microprocessors and Microcontrollers", New Age International.
3. Deniel Tabak, "Advance Microprocessor", TMH.
4. Triebel & Singh, "The 8088 and 8086 Microprocessors", Pearson Education.

**BCA-6043**  
**Data Compression**

**L T P**  
**3 1 0**

**Unit-1** **10**

**Compression Techniques:** Loss less compression, lossy compression, measures of performance, modeling and coding, mathematical preliminaries for lossless compression: A brief introduction to information theory, models: Physical models, probability models, Markov models, composite source model, uniquely decodable codes and prefix codes.

**Unit-2** **10**

**Huffman coding algorithm:** Minimum variance Huffman codes, adaptive Huffman coding, update procedure, encoding procedure, decoding procedure, applications of Huffman coding: loss less image compression, text compression and audio compression.

**Unit-3** **12**

**Coding a sequence:** Generating a binary code, Comparison of Binary and Huffman coding, Applications, Bi-level image compression-The JBIG standard, JBIG2, Image compression, Introduction of Dictionary Techniques, **Static Dictionary:** Diagram Coding, and Adaptive Dictionary.

**Unit-4** **08**

**Distortion criteria, Models, Scalar Quantization:** The Quantization problem, uniform quantizer, adaptive quantization and non-uniform quantization.

**Text Books:**

1. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publishers.
2. Peter D. Johnson Jr., Greg A. Harris, D.C. Hankerson, "Introduction to Information Theory and Data Compression", CRC.
3. David Salomon, "Data Compression: The Complete Reference 4th Edition", Springer.

**Reference Books:**

1. Drozdek, "Elements of Data Compression", Cengage Learning.
2. Timothy C., "Text Compression", Bell Prentice Hall.
3. Nitin Chikani, "The Complete Format of Data Compression & Decompression", Lambert.

**BCA-6044**  
**Cryptography**

**L T P**  
**3 1 0**

**Unit-1** **10**

**Introduction to Security:** Introduction to security: Attacks, services & mechanisms, security. Conventional encryption model, classical encryption techniques, steganography, modern techniques: simplified DES, block cipher principles, DES standard, DES strength, differential & linear cryptanalysis, block cipher design principles and block cipher modes of operation.

**Unit-2** **08**

**Conventional Encryption Algorithms:** Conventional Encryption Algorithms: Triples DES, blowfish, International data encryption algorithm, RC5, placement of encryption function and key distribution.

**Unit-3** **10**

**Public Key Encryption:** Public Key Encryption: public, key cryptography: principles of public, key cryptosystems, RSA algorithm, key management, Fermat's & Euler's theorem, primality test and the Chinese remainder theorem.

**Unit-4** **12**

**Message Authentication & Hash Functions:** Message Authentication & Hash Functions: Authentication requirements, authentication functions, message authentication codes, hash function, md5 message digest algorithm, secure hash algorithm (SHA), and digital signatures.

**Text Books:**

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.
2. Atul Kahate, "Cryptography and Network Security", TMH.
3. Douglas R. Stinson, "Cryptography: Theory and Practice", CRC press.

**Reference Books:**

1. William Stallings, "Network Security Essentials: Applications and Standards", Prentice Hall.
2. Johannes A. Buchmann, "Introduction to cryptography", Springer, Verlag.
3. Wenbo Mao, "Modern Cryptography: Theory and Practice", Prentice Hall PTR.
4. Simon Rubinstein Salzedo, "Cryptography", Springer.

**BCA-605P**  
**Advanced Technology (Dot Net) Lab**

**L T P**  
**0 0 3**

1. Familiarization with IDE.
2. Programming Console applications using VB.NET covering all the aspects of VB.NET fundamentals
3. Object oriented programming using VB.NET covering objects, Inheritance, Polymorphism, Constructors, Static Classes, and Interfaces.
4. Programme to illustrate Exception Handling concepts.
5. Programme to illustrate use of Collections.
6. Programme to perform File I/O Operations.
7. Programming Windows applications using VB.NET covering all major controls and components, Menus, MDI, Event Handling.
8. Creating windows installer.
9. Programme to interact with Database from a Windows Desktop Application.
10. Programming to build web applications using web controls, maintaining state.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.