

# **Bachelor of Computer Applications/ Lateral Entry (BCA/ (L.E.)**



**School of Computer Science**  
**TAMIL NADU OPEN UNIVERSITY**  
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**Chennai – 600 015**

**Tamil Nadu Open University**  
**School of Computer Science**  
**Bachelor of Computer Applications**

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**Regulations**

**Programme Learning Objectives (PLOs):**

- PLO:1 Posses strong fundamentals to solve problems, think independently and to understand the role of Computer Science in Information technology
- PLO:2 Develop the students to understand the basics of Computer Science
- PLO:3 Realize the significance of software development.
- PLO:4 Acquire the skills to use appropriate theory, practices and tools to design, implement, test and evaluate systems to solve problems in Computer Science and other fields
- PLO:5 Enhance the Employment Opportunity to the youths.

**3. Programme Specific Objectives (PSO):**

- PSO:1 Apply the knowledge of mathematics and science fundamentals to solve the complex problems.
- PSO:2 Identify and resolve right issues at right time.
- PSO:3 Develop variety of real time applications using latest technologies.
- PSO:4 Combine analytical, logical and managerial skills with the technical aspects to resolve real world issues.
- PSO:5 Possess strong foundation of computer knowledge for their higher studies.
- PSO:6 Apply the suitable techniques to effectively manage business challenges.

**Bachelor of Computer Applications and Lateral Entry**  
**Distance Mode – Semester Pattern**

Course Code	Course Title	Credits	Marks Distribution		
			Internal	External	Total
<b>FIRST YEAR:</b>					
BFTM 11	Tamil [or] any one of the other languages	6	25	75	100
BFEG 11	English Language	6	25	75	100
BCM-01	Mathematics	4	25	75	100
BCA - 01	Computer Fundamentals & PC Software	3	25	75	100
BCA - 02	C Programming and Data Structure	3	25	75	100
BCA - 03	Introduction to System Software	3	25	75	100
BCA – P1	Lab 1 – Programming in C with Data Structure	3	25	75	100
<b>TOTAL</b>		<b>28</b>	<b>175</b>	<b>525</b>	<b>700</b>
<b>SECOND YEAR:</b>					
BCA - 04	Introduction to Computer	4	25	75	100

	Organisation				
BCA - 05	Elements of System Analysis and Design	4	25	75	100
BCA - 06	Introduction to Database Management Systems	4	25	75	100
BCA - 07	Windows Programming	4	25	75	100
BCA - 08	Multimedia	4	25	75	100
BCA - 09	Relational Database Management Systems	4	25	75	100
CCE	Environmental Studies	4	25	75	100
BCA – P2	Lab 2 - Windows Programming and Software Engineering	4	25	75	100
<b>TOTAL</b>		<b>32</b>	<b>200</b>	<b>600</b>	<b>800</b>
<b>THIRD YEAR:</b>					
BCA - 10	Computer Network	4	25	75	100
BCA - 11	Introduction to Software Engineering	4	25	75	100
BCA - 12	Computer Oriented Numerical Methods	4	25	75	100
BCA - 13	TCP / IP Programming	4	25	75	100
BCA - 14	C++ and Object Oriented Programming	4	25	75	100
BCA - 15	Theory of Computer Science	4	25	75	100
BCA - 16	Introduction to Internet Programming	4	25	75	100
BCA - 17	Intranet Administration	3	25	75	100
BCA - 18	Management Principles and Technique	3	25	75	100
BCA – P3	Lab: C++, Internet Programming, Java/ActiveX	4	25	75	100
BCA – P4	Mini project	4	-	-	100
<b>TOTAL</b>		<b>42</b>	<b>250</b>	<b>750</b>	<b>1100</b>
<b>GRAND TOTAL</b>		<b>102</b>	<b>625</b>	<b>1875</b>	<b>2600</b>

## Syllabus

### FIRST YEAR

#### **BCA 01.COMPUTER FUNDAMENTALS AND PC SOFTWARE**

**Block 1: Computer Fundamentals: Hardware & Software:** Introduction – Structure of a Computer - IC Technology – Classifications – Applications. Peripheral devices and Technologies: Memory - Types of memories - Input devices – Output devices – I/O interfaces –Parallel Processing – Pipelining – Vector processing – RISC System. Software Concepts and Terminology: Types of Software – System software and Applications software - Computer languages: Machine – Assembly – High Level – 4GL – Fundamentals of Programming languages. Operating System Concepts: Definition Evolution of Operating System -Types of Operating Systems: Batch – Multiprogramming - Network - Distributed Operating System

**Block 2: Data communication:** Fundamentals - Data Communication codes - Speed of communication –Channels -Types of Transmission: Analog – Digital -Parallel and Serial Transmission- Data Communication Modes: Synchronous and Asynchronous - Modes of communications: Simplex-Half-Duplex-Full Duplex – Elements of Communication Hardware: Sender / Receiver Hardware – Devices – Channels. Computer Networks and Recent Trends: Network concepts – Types of networks - LAN – WAN - Applications of Networks: E-mail – EDI – Trends: Internet – BITNET – ISDN – NICNET – CompuServe. Computer Security: Definition – Breaches of Security – Measures: Physical - Software – Network – Password – Role of Cryptography - Crypt analysis - Computer Virus: Definition – Classification – Protection and Cure.

**Block 3:** Graphical User Interface – Concepts – MS-Windows – Elements of Windows - Working with windows - Working with dialog Box. – Managing System in Windows: System settings – Backup – Disk Drive Utilities – Add/Remove applications – Windows for Multi User. – Windows Explorer: Working with Files – Working with Folders – Recycle Bin – Program and Accessories – Running User programs – Use – Writing and Drawing. Communication through network: E-mail – Internet – Multimedia: Types of media – Tools.

**Block 4 :** PC software: MS-Word – Getting Started – Working with Text – Common Features – Find and Replace – Editing – Proofing tools. Text Formatting: Character – paragraph – templates. Page Formatting: Page Setup – Margins – Header – Footer – Numbering. Working with Tables – Mail Merge – Macros – Printing a document – protecting a document. PowerPoint: Basic concepts – Presentation – Working with tools.

#### Reference Books:

1. Computer System Architecture and Organisation by Mano, M.Morris, McGraw Hill.

2. Data and Computer Communication by William Stalling, PHI.
3. The complete reference windows 98 by Levin and Young.
4. Microsoft Office 97 professional essentials by Laura Acklain ed.al.

#### Web Links

1. [https://www.youtube.com/watch?v=eEo\\_aacpwCw](https://www.youtube.com/watch?v=eEo_aacpwCw)
2. <https://www.youtube.com/watch?v=xnyFYiK2rSY>
3. <https://www.youtube.com/watch?v=ULgKbLWhgEM>
4. <https://www.youtube.com/watch?v=8-zszpZ3Yw>
5. <https://www.youtube.com/watch?v=DzTCFsdXMP4>

## **BCA 02 'C' PROGRAMMING AND DATA STRUCTURE**

**Block 1 :** Introduction to C programming language – Data types – Identifiers – Variable declaration – Enumerated data types – typedef statement – Operators : Arithmetic – relational – logical – cast – increment – decrement – bitwise – precedence of operations – expressions – decision structures : goto – if – Escape sequences – Structure of C program.

**Block 2 : Control structures :** while – do.. while – if then else – switch – for loops – default statement – Arrays : One – multi dimensional – Declaration of array structure – Simple programs - Size of operators – Storage classes and scope – Functions : Function declaration – Prototyping – Pointers – Pointer variable – Pointers as function argument – One, multi dimensional arrays as function arguments. Files – Files I/O – Structures – Unions.

**Block 3 : Data Structures :** Introduction – arrays – representation of arrays in memory – sparse array – Lists: Basic concepts – Implementation of Lists – Doubly linked list – Circular linked list – Garbage collection – Stacks and Queues : Stack operations – Array and pointer implementation of stacks – Application of stacks – Queue operations – Implementation of queues – Application of queues. Graph: Basic Terminology – Representation – Traversals - DFS – BFS – Shortest path problem – Minimal spanning tree.

**Block 4 : Trees :** Concepts – Binary tree – Binary Tree traversals – inorder – preorder – postorder – Binary search tree (BST) – BST operations – Balanced Tree – AVL Tree – B-Tree – Operations of B-Tree – Files : Terminology – File organizations – Sequential – Direct – Indexed – Advantages and disadvantages of file organizations. Searching : Linear search – Binary search. Sorting: Definition – Sorting techniques : Insertion – Bubble – Quick Sort – 2 way merge – Heap – Data Storage: Magnetic Tapes, Disk – Sorting with disk and tape – Buffering.

#### Reference Books :

1. C programming by Dr. E. Balagurusamy
2. Fundamentals of Computer Algorithms by Ellis Horowitz & Sahni.
3. How to Solve it by computer by R.J.Dromey.

#### Web Links

1. <https://alvinser.com/fundamentals-of-c-programming.html>

2. <https://www.ibm.com/docs/en/itcam-app-mgr/7.2.0?topic=tesl-operators-expressions-1>
3. <https://www.programtopia.net/c-programming/docs/operators-expressions>
4. <https://www.youtube.com/watch?v=B31LgI4Y4DQ>
5. <https://www.youtube.com/playlist?app=desktop&list=PL8BFLnh-1eY5vNP6wO75Fb1RULDw6mWnx>
6. <https://www.youtube.com/watch?v=LbcJw-iMIoI>

## **BCA 03 INTRODUCTION TO SYSTEM SOFTWARE**

**Block 1 :** Introduction - Programming Language Concepts – Categories of languages – Elements of programming languages - System software tools: Assembler – Implementation – Macro & macro processors – Loaders – Compiler : Approaches to compiler development – Phases of compiler Software tools – Lex – Yacc – Program Development tools. – GUI – Text Editor – Debugging System.

**Block 2 :** Operating system – Evolution – Types of operating system – Structure of Operating system : Layered – Kernel – Virtual – Client Server Model – Process Management : Concept – Processor scheduling – Inter Process Communication – Deadlocks – Memory Management : Multiprogramming with Fixed and Dynamic partition – Virtual memory – Paging – Segmentation – File Management : File concepts – Directories – Disk space management – Disk allocation methods – Disk scheduling – File protection.

**Block 3 : UNIX OS I :** Features – File structures – CPU scheduling – Memory management : Swapping – Demand paging – Working with UNIX OS – File system commands – File permissions – Change Mode – Standard files – Processes – Text Manipulation : Inspecting files – Operating of Files – Editors : Vi – Ex – Ed – sed – awk.

**Block 4 : Unix OS II :** User Communication : Online – offline – Shell Programming : Definition – Types of Shells – Wild Cards – Simple Shell programs – Variables – Programming constructs – Interactive shell scripts – Advanced features. Programming Tools : Unix C compiler – C verifier – Lint – Maintaining programs. System Administration : Definition – Booting – Maintaining user accounts – Files systems and special files – Backups and Restoration.

Reference Books :

1. Operating System concepts by Abraham Silbertschatz and James L.Peterson.
2. The design of the Unix Operating System by Maurice J.Bach, PHI.
3. Introducing Unix System by Rachel Morgan & Henry McGilton, McGraw Hill.
4. System Software by Leland L.Beck, Addison Wesley publishing Company.

Web Links

1. <https://www.youtube.com/watch?v=IdXrCPzNnkU>
2. <https://www.youtube.com/watch?v=W3bkxeRmI1w>
3. <https://www.youtube.com/watch?v=392uyAUJqO4>
4. <https://www.youtube.com/watch?v=vLPdBp9vv9Y>

## **BCA 04 INTRODUCTION TO COMPUTER ORGANISATION**

**Block-1 : Data Representation** : Introduction – The Von Neumann Architecture – Generation of Computers – Data Representation : Decimal – Alphanumeric – Fixed – Decimal Fixed – Floating point – Error Detection and Correction codes – Instruction Execution. Digital Logic Circuits – Introduction – Boolean Algebra – Logic Gates – Combinational Circuits – Sequential Circuits – Inter connection structures.

**Block-2 : Peripheral Devices** : Memory Organization : Introduction – various memory devices – Types of Random Access Memory – Types of Auxiliary memory – High Speed Memories : Cache Memory – Interleaved Memory – Associated Memory. IO Organization : I/O Model – I/O Techniques – DMA – I/O processes – External Interface.

**Block-3 : Instruction Set** : Introduction – Characteristics – Addressing Modes – Instruction format – Examples. Registers organization : Structure of CPU – Register Organization – Micro operation – ALU Organisation – Control Unit Organisation – Microprogrammed Control Unit – Microinstruction: sequencing – Microinstruction Execution.

**Block-4 : Microprocessor and Assembly Language Programming** : Introduction – Microcomputer architecture – CPU components – Instruction set – Introduction to Motorola 68000 microprocessor – Assembly Language : Introduction – Assembly language fundamentals – I/O services – Assembly language program development tools – Examples : COM programs – EXE programs – Simple assembly language programs – Programming with loops and strings – Arrays – Modular program – Interface to high level program – Interrupts.

Reference Books :

1. Mano M.Morris, Computer System Architecture, Third edition, Prentice Hall of India (1983)
2. Hayes,John.P, Computer Architecture and Organisation, Second edition, McGraw Hill International editions, 1988
3. Douglas V.Hall, Microprocessors and Interfacing – Programming and Hardware- McGraw Hill, 1986.

Web Links

1. <https://www.youtube.com/watch?v=SbqXqQ-2ixs>
2. <https://www.youtube.com/watch?v=YLsnvNk-D0k>
3. <https://www.youtube.com/watch?v=FS4Ccfe17QA>
4. <https://www.youtube.com/watch?v=AnfE2AIT-sU>

## **BCA 05 ELEMENTS OF SYSTEMS ANALYSIS AND DESIGN (SAD)**

**Block 1** : Introduction – Definition of a System – Characteristics of a system – Elements of Systems Analysis – System development life cycle – Software crisis – Role of Systems Analyst – Project Selection : Project request – Managing Project

selection – Preliminary investigation – Problem classification and definition – Feasibility study : Types of feasibility – Investigative study – Cost Benefit Analysis – Fact finding techniques – DFD – Data Dictionaries – HIPO – Decision tables and Decision Trees – Warnier Orr Diagrams.

**Block 2 : Structured System Design** : Introduction – Design Methodologies – Structured Design – Modularization – Design process – Systems Specifications – Prototype design – Input design and control : Elements of Input data – Processing transaction data – Design guidelines – Input verifications and control – Layout of Terminal screen – Output System design – Output devices – Types of Output – Designing screen output/report – Form design – File and Database design – Types of file – File Organisation – File design – Database Design – Coding system – Types of Code.

**Block 3 : System Development** : Task of System development – Selection of Hardware and Software – Benchmark testing – Software selection criteria – Quality Assurance – Levels – Maintenance Issues – Levels of Test – Testing plan – Designing test data – System control – Documentation : Characteristics – Types of Documentation – Need for documentation – Tools – System Implementation : Conversion methods – Post Implementation Review – Review Plan – System Maintenance – MIS : Concept – Overview of Computing, Communication and Database technologies – DSS – Knowledge based system – Impact of MIS – Building MIS : Techniques

**Block 4** : Emerging Trends – Attributes of a Good Analyst – Organisational Issues – Communicating with Computers – Ergonomics – Human problems in Automated office - Multimedia : Introduction – Components of Multimedia – Hardware and Software requirements – Simple case studies : Information system planning – Evaluation and Selection of a system.

Reference Books:

1. Systems Analysis and Design by James. A. Senn
2. Systems Analysis and Design by Elias M. Award.

Web Links

1. [https://www.youtube.com/watch?v=Vjpu\\_P-LHTo](https://www.youtube.com/watch?v=Vjpu_P-LHTo)
2. <https://www.youtube.com/watch?v=vI-ohUdXW9Q>
3. [https://www.youtube.com/watch?v=HtK\\_q4aM2Yg](https://www.youtube.com/watch?v=HtK_q4aM2Yg)
4. <https://www.youtube.com/watch?v=8Ffjmgwrn-E>

## **BCA 06 INTRODUCTION TO DATABASE MANAGEMENT SYSTEM**

**Block 1 : DBMS concepts** : Introduction – Basics of Database – Three views of Data – Three level architecture of DBMS – Facilities – Elements of DBMS – Advantages and disadvantages – Database Models : File Management system and its drawbacks – Database Models : E-R Model, Hierarchical Model, Network Model, Relational Model.



**Block 2: File Organization** : Introduction – Methods of File Organization – Sequential, Direct, Index Sequential – Multi Key file organization – Management Considerations : Objectives – Conversion – Evaluation of DBMS – Administration of DBMS.

**Block 3: RDBMS and DDBMS** : Introduction – Relational Model – Concept – Definition of a relation – Relational algebra and relational completeness – Normalization : Objectives – Functional dependency – Anomalies in a database – Properties of Normalization – Various Normalization techniques – Examples of database design – SQL : Types of SQL commands – Data definition – Data Manipulation statements – Distributed Databases : Structure of Distributed database – Design of Distributed database.

**Block 4 : Trends in DBMS** : Objectives – Next generation Database – Application – Object Oriented system – Object Oriented DBMS – Pitfalls of RDBMS – Comparison of RDBMS and OODBMS – Client/Server Database : Objective – Evolution – Client/Server computing – Critical Products – Knowledge base Management system : Objectives – Definition and importance of Knowledge – Difference of KBMS and DBMS.

Reference Books :

1. Database System Concepts by Silberschatz, Korth and Sudarshan, McGraw Hill.
2. An Introduction to Database systems by Bibin C. Desai, Galgotia Publications.

Web Links

1. [https://www.w3schools.com/sql/sql\\_intro.asp](https://www.w3schools.com/sql/sql_intro.asp)
2. <https://www.geeksforgeeks.org/difference-between-dbms-and-sql/>
3. [https://www.tutorialspoint.com/dbms/sql\\_overview.htm](https://www.tutorialspoint.com/dbms/sql_overview.htm)
4. <https://www.guru99.com/database-normalization.html>
5. <https://www.ibm.com/in-en/cloud/learn/cap-theorem>

BCA Lab - 1 : Programming in C with Data Structure

## **SECOND YEAR**

### **BCA 07 WINDOWS PROGRAMMING**

**Block 1 : Introduction to Windows Programming and Visual Basic:** Components of Windows Programming : Graphical User Interface – Window and its elements – Dialog Box – Drop-Down and Pop-Up menus – Visual Basic – Event-Driven Programming – Steps in Building a Project – User Interface Design – Writing Code – Visual Basic IDE – Creating and Running a simple project

**Block 2 : Visual Basic Forms and Controls:** Form – Tool Box controls – Property window – Design and Run-time properties – Events – Keyboard, Mouse, Code and System events – Visual Basic Object oriented programming – Creating buttons at run-time through object declaration - Screen, Printer, Error Objects

**Block 3 : Visual Basic Programming** : Visual Basic Data Types - Constants: predefined constants – User-Defined constants – Variables – Scope Rules – Control Structures – If – Select Case – Loops – FOR , DO, WHILE loops – Goto – On Goto statements – Event procedures – User defined procedures – Library functions – Numeric, String, Boolean and miscellaneous functions – Sub Main() procedure – User-defined functions – Public, Private Scope rules – Creating EXE files – Arrays – User-defined data type – Type statement – Control Arrays – Graphics handling – Using multiple forms – Activating a form – Multiple Document Interface – A simple MDI application

**Block 4** : Visual Basic Advanced Features Creating a Database in VB – Accessing an external database with Data Control – Object Linking and Embedding (OLE): Linking and embedding an excel worksheet with VB project – Using third-party controls in VB - Creating an Active X control project – Activating other applications from VB – Windows Application Program Interface functions (WINAPI)

Books of Reference :

“Visual Basic 6 from ground up” by Garry Cornell, TMH, 1999.

Web Links

1. <https://www.youtube.com/watch?v=-HNNCem5MoQ>
2. [https://www.tutorialspoint.com/vb.net/vb.net\\_basic\\_controls.htm](https://www.tutorialspoint.com/vb.net/vb.net_basic_controls.htm)
3. <https://www.youtube.com/watch?v=vTS0-BWHE0M>
4. <https://www.youtube.com/watch?v=XdSbp1A6eQc>
5. <https://www.youtube.com/watch?v=oWRxt48IRzo>

## **BCA 08 MULTIMEDIA**

**Block 1 : Multimedia Overview** : Concept – Hardware for multimedia : CPU – Monitor – I/O devices – CD-ROM – Sound Card – Laser Disc – DVD – Software for multimedia – Multimedia Components: Textual Information – Images – Animation – Digital Audio – Video – Multimedia Design – Production of Multimedia – Distribution of Multimedia.

**Block 2 : Applications of Multimedia** : Introduction – Areas of applications: Entertainment – Edutainment - Business communications – Knowledge transfer – Public Access - Multimeida in Publishing Industry – Communication Technology and Multimedia Services – Multimedia in Business – Multimedia Pedagogues : Interactive systems for teaching and learning – Distributed learning environment – Case Study.

**Block 3 : Multimedia Authoring tools** : Development tools – Features of Authoring Software – Authoring tools : Aruthorware – Everest Authoring system – Icon Author

- ImageQ – Macromedia Director – QuickTime – Hypertext – Elements of Hypertext
- Applications of Hypertext: Computer, Business, Education and Entertainment.

**Block 4 : Multimedia development Issues and Suggestions** : Learning interface design : Interface design – psychology of learning – Working with learning style – Considering interface design – Planning the Multimedia Programme/Application : Defining the Goal – Outlining – Logic Flowchart – Program Storyboard – Planning for Creation of Multimedia building blocks – Copyright issue and its management – Development TIPS of multimedia building blocks : Text – Graphics in Multimedia – Sound and video in multimedia applications – Multimedia Authoring.

Reference Books:

1. Multimedia, An Introduction by John Villamit Casanova, Louis Molina, PHI.
2. Multimedia Making it work by Tay Vaughan, Tata McGraw Hill.
3. Multimedia Systems by John F Koegel Buford, Addison Wesley.

Web Links

1. <https://www.youtube.com/watch?v=Fg06vz1Krc>
2. <https://www.youtube.com/watch?v=-e9JXN5POhI>
3. <https://www.youtube.com/watch?v=MkxLU6HiCbI>
4. <https://www.youtube.com/watch?v=1UMBt9HevqY>
5. <https://www.youtube.com/watch?v=davcYvCJ63w>

## **BCA 09 RELATIONAL DATABASE MANAGEMENT SYSTEMS**

**Block 1** : RDBMS Terminology – Introduction to Database Management System – Relational Model definitions – Relational Data Integrity – Data Dictionary – Logical Database Design : Steps of Database Design – ER Model – Attributes – Relationship – Weak entities – Components of an ER diagram – Example

**Block 2 : Normalization** : Objectives – Role of Normalization – Single-valued dependencies – Single-valued normalizations : 1NF, 2NF, 3NF, BCNF – Properties of decomposition – Multivalued dependencies – Multivalued normalization – Fourth Normal form – Use of Fifth Normal form – Rules of Data normalization.

**Block 3 : Practical on RDBMS** : Block Objectives – ER diagram – Functional dependency and Normalization – SQL – Microsoft Access – Views and Security using SQL - Microsoft Access : Objectives – Meaning of Microsoft Access Database – Concepts – Tables and Queries – Forms and Reports.

**Block 4** : Introduction - Opening a Database – Objects of the Access Database – Working with Database – Creating Database – Creating Objects – Setting toolbars – Creating Tables : Fields and Data types – Setting field properties – Add and save records – Edit Records – Modify fields – Modify datasheet – Finding Data : Find and Replace – Filter – Sorting records – Creating a Query – Creating a Form – Customising form – A form with multiple tables – Creating reports.

Reference Books :

1. An Introduction to Database System by C.J.Date, Addison Wesley.

2. Database system concepts by Silberschatz, Korth and Sudarshan, McGraw Hill.
3. An Introduction to Database Systems by Bipin C.Desai, Galgotia publications.

#### Web Links

1. <https://nptel.ac.in/courses/106106095>
2. <https://www.youtube.com/watch?v=YD8dhOmuVnY>
3. <https://www.youtube.com/watch?v=qTR8QnYXHvQ>
4. <https://www.youtube.com/watch?v=qRqzmAwmJwY>
5. [https://www.youtube.com/watch?v=LUL1nnxUz\\_c](https://www.youtube.com/watch?v=LUL1nnxUz_c)

## **BCA 10 COMPUTER NETWORK**

**Block-1: Introduction to Computer Network** : Uses of Computer Networks-LAN-MAN-WAN-Point to- Point Networks-Broadcast Networks-OSI Reference Model-TCP/IP reference model - Data Transmission : Transmission media – Twisted Pair – Coaxial cable – Baseband – Broadband – Fiber optics – Wireless Transmission Radio – Microwave – Infrared – Lightwave transmission – Communication Satellites.

**Block-2 : Medium Access Control and Datalink Layer** : Data Link Layer design issues – Elementary data link protocols – Channels Allocation problem – ALOHA Protocols – CSMA – IEEE Standard 802.3 and Ethernet – IEEE 802.4 Token Bus – IEEE 802.5 Token Ring.

**Block-3 : Network, Transport and Applications** : Network Layer Design Issues – Routing Algorithms – Shortest path – Flooding – Congestion Control Algorithms. Transport Layer : Service – elements of Transport Protocols – TCP – UDP – Application Layer – DNS – Email – WWW.

**Block-4 : Network Devices** : Repeaters – Bridges – Switches – Hubs – Gateways – Modem – ISDN – Broadband ISDN – Narrow Band ISDN – ATM

Reference Book :

Andrew S.Tanenbaum, “Computer Networks”, Third Edition, Prentice-Hall of India, New Delhi, 2001.

#### Web Links

1. <https://www.youtube.com/watch?v=4D55Cmj2t-A>
2. <https://www.youtube.com/watch?v=G0h0dC4Zyycs>
3. <https://www.youtube.com/watch?v=48HdIBN5qfI>
4. [https://www.youtube.com/watch?v=MmK8Ra8J\\_1o](https://www.youtube.com/watch?v=MmK8Ra8J_1o)
5. <https://www.youtube.com/watch?v=mKshc6dxZE8>

## **BCA 11 INTRODUCTION TO SOFTWARE ENGINEERING**

**Block 1 : Software Engineering Concept** : Definition – Software Product – Components and characteristics – Phases in Software development – Software Process Models: Linear Sequential – Prototyping – RAD – Spiral – Incremental – Formal methods – Fourth generation techniques.

**Block 2 : Project Management Concepts** : People – Product – Process – Project Development Team Structures - Software Crisis – Role of System Analyst – Project planning and control : Planning objectives – Software scope – Resources – Project Estimation – Decomposition Techniques – Estimation Models – Project standards – Outsourcing – Risk Management : Risk – Identification – Projection – Refinement – Mitigation.

**Block 3 : Project Scheduling and Tracking** : Basic concepts – Defining task set for the software project – Scheduling Plan – Software Quality Assurance : Quality concepts – Quality Assurance Activities – Software Reviews – Formal Technical Reviews – Software Reliability – ISO 9000 quality standards – Software Configuration management.

**Block 4 : Software Analysis, Design and Testing** : Analysis concepts and principles – Software prototyping – Specification Modeling and Information flow – Behavioural Modeling – Design Concepts and principles – Modular design – Architectural design and process – User Interface design – Software Testing : Principles – Test case design – White Box test – Block box testing – Testing Strategies : Unit – Integration – Validation – System – Art of debugging – Case study.

Reference Books :

1. Software Engineering Practitioner's Approach by Roger S. Pressman
2. Software Engineering Concepts by Richard and Fairlay
3. An integrated approach to Software Engineering by Pankaj Jalote.

Web Links

1. <https://clearbridgemoible.com/cloud-apps-vs-web-apps/>
2. <https://searchcloudcomputing.techtarget.com/definition/cloud-application>
3. <http://users.csc.calpoly.edu/~jdalbey/308/Lectures/SoftwareProcessModels.html>
4. [http://www.se.rit.edu/~se361/Slides/se361\\_Chapter\\_03.pdf](http://www.se.rit.edu/~se361/Slides/se361_Chapter_03.pdf)
5. <https://www.tutorialride.com/software-engineering/agile-process-in-software-engineering.htm>
6. <https://smartbear.com/learn/automated-testing/software-testing-methodologies/>
7. [https://www.tutorialspoint.com/software\\_engineering/software\\_testing\\_overview.htm](https://www.tutorialspoint.com/software_engineering/software_testing_overview.htm).

## **BCA 12 COMPUTER ORIENTED NUMERICAL METHODS**

**Block 1 : Computer Arithmetic and Solution of Non-Linear Equations** : Introduction – Floating Point Arithmetic and Errors: Floating point represent of Numbers – Sources of Errors – Non-Associativity of Arithmetic – Propagated Errors – Pitfalls in Computation. Solution of Non-Linear equations: Bisection – Fixed point – Regula falsi – Newton's Raphson – Secant method. Convergence criteria of Iterative methods .

**Block 2 :** Solution of simultaneous Linear Algebraic Equations and ordinary differential equations : Cramer's Rule - Gauss elimination method – Pivoting Strategies - Gauss Jordan method – Jacobi Iterative method – Gauss Seidal method – Comparison of Direct and Iterative methods.

**Block 3 : Interpolation and Curve Fitting :** Problem of Interpolation - Langranges method of Interpolation – Inverse Interpolation – Newton's interpolation formulae – Error of the Interpolating Polynomial - Interpolation at equally spaced points : Forward and Backward differences – Newton's forward and backward difference formulas. Fitting of polynomials and other curve - Least square approximation of functions - linear and polynomial regressions.

**Block 4 : Numerical differentiation and Integration :** Differentiation based on polynomia fit - Numerical integration using Simpson,s rule and Gaussian quadratic formula - Numerical solution of differential equations of the form  $dy/dx=f(x,y)$  using Euler,s method and Runge-Kutta methods.

Reference Books :

1. Numerical methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.
2. Elementary Numerical Analysis by Samuel D.Conte and Cart de Boor, McGraw Hill International Edition.
3. Numerical methods for Science and Engineering, PHI by R.G.Stanton
4. Computer based numerical algorithms by E.V.Krishnamoorthy
5. Introduction to Numerical Analysis by E.Atkinson.

Web Links

1. <https://www.youtube.com/watch?v=Tj1sPw73R1U>
2. <https://www.youtube.com/watch?v=luqB02FMF9Q>
3. [https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/video\\_galleries/video-lectures/](https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/video_galleries/video-lectures/)
4. <https://www.youtube.com/watch?v=2Rwx100VMvQ>
5. <https://jmahaffy.sdsu.edu/courses/s10/math541/lectures/pdf/week07/lecture.pdf>
6. <https://www.youtube.com/watch?v=mpkfYmnCZJw>

BCA-P2: Lab – 2 : Windows Programming and Software Engineering

## THIRD YEAR

### **BCA 13 TCP/IP PROGRAMMING**

**Block 1 : Introduction to TCP/IP :** Introduction – TCP/IP layering – TCP/IP Stack : TCP level – IP level – Ethernet level – Internet Addressing: IP Address Format – IP address classes – Domain Name System (DNS) - Characteristics – DNS message format – Client Server Model.

**Block 2 : Internet Protocol (IP) :** Definition – IP Header – Structure – Components – IP Address – IP Address components – Formats and Classes – IP Routing – IP subnet addressing – subnet mask.

**Block 3 : Transmission Control Protocol (TCP) :** Introduction – Basic Terminology - TCP Header – Structure – Components - Features of TCP .

**Block 4 : User Datagram Protocol (UDP) – Terminology – UDP Header – Structure – Format – Characteristics of UDP – Features of UDP, Internet multi casting – TCP/IP over ATM networks – Client Server model of Interaction Socket Interface.**

#### Reference Books

1. Internetworking with TCP/IP Volume – I Principles, Protocols and Architecture by Douglas E. Comer
2. TCP/IP : Architecture, Protocols and Implementation by S.Felt, WCB / McGrawHill.
3. Introduction to TCP/IP by Forouzan, McGraw Hill 1999.

#### Web Links

1. <https://www.youtube.com/watch?v=ep8uWbSg1K8>
2. <https://www.youtube.com/watch?v=2-tKEVE9cE>
3. <https://www.youtube.com/watch?v=x5l5Z1j62iQ>
4. <https://www.youtube.com/watch?v=c8aet11HNxg>
5. [https://www.youtube.com/watch?v=HF\\_znV8x9a0](https://www.youtube.com/watch?v=HF_znV8x9a0)

### **BCA 14 C++ AND OBJECT ORIENTED PROGRAMMING**

**Block-1 : C++ Fundamentals :** Object Oriented Programming - Programming Paradigms – Benefits and Concepts – Advanced Concepts – OOP languages – Overview of C++ - Structure of a C++ Program – Header Files - Keywords – Tokens and Identifiers – Compiling – Running C++ programs - Constants and Variables: Data Types – Integer – Float – Char – Double – Pointer – Variable and Constant declarations – Macro definitions – Reference variables – Complex variables – Type conversions – Type casting – Storage classes : auto, register, static, extern - Input and Output: Stream I/O – I/O Manipulators – Creating I/O manipulators – IOS flags – Stream buffer class hierarchy

**Block-2 : Programming Constructs** : Operators: Arithmetic – Relational – Logical – Assignment – Pre and Post Increment & Decrement – Bitwise – Scope Resolution :: operator – ?(conditional) – Value operator – Member operator – Indirection operator – new and delete operator – Precedence rules – Control structures: if – else – if elseif ladder – switch case - Iterative constructs - Loops – for loop – while loop – do while loop – Initialisation – exit condition – increment/decrement for three loops compared – Nesting loops – Creating infinite loops – break and continue statements – goto statement and labels

**Block-3 : Data Structures** : Arrays: Single Dimensional arrays - Declaration – Initialization – Multi-Dimensional arrays – Declaration – Initialization – Addressing method – Subscripts – Character arrays – Initialization – Null Character – Multi-dimensional character arrays – Structures: – Declaration – Definition – Bitfields – Array of structures – Structure containing arrays – Pointer to structures – Structures versus unions – Anonymous unions

**Block – 4 : Structured and Object Oriented Programming** : Functions: Structured Programming – Function definition & declaration – Parameters – Arguments – Return Values – void – Call by value parameters – Call by reference parameters – Passing arrays – Passing structures – Passing a function to another function – Pointer to function – Recursive function – Classes : and Objects – Visibility Labels – private, public and protected – Data members – Member functions – Object declaration and accessing members – Passing objects to functions – Returning objects – Constructor function – Destructor function – friend functions – static data and function members – Inline functions versus macros – Overloading: Compile-Time Polymorphism – Function overloading – Rules for function overloading – Operator overloading – rules for operator overloading - Function templates – Class templates – Extensibility – Reusability – Inheritance – Run-Time Polymorphism – Virtual functions – Files: fstream header file - text and binary files creation and access – random access in files – storing objects in files – command-line arguments to main() function – Exception handling – Unified Modeling Language (UML) – Context Diagrams

Reference Books :

1. The C++ programming language, Bjarne Stroustrup, Pearson publications.
2. Object Oriented Programming in C++ by N.Barkakati, PHI.

Web Links

1. <https://www.ibm.com/docs/en/itcam-app-mgr/7.2.0?topic=tesl-operators-expressions-1>
2. <https://www.programtopia.net/cpp-programming/docs/operators-expressions>
3. [https://www.simplilearn.com/tutorials/cpp-tutorial/cpp-interview-questions?source=sl\\_frs\\_nav\\_playlist\\_video\\_clicked](https://www.simplilearn.com/tutorials/cpp-tutorial/cpp-interview-questions?source=sl_frs_nav_playlist_video_clicked)
4. <https://askaboutcpp.blogspot.com/2010/07/specifying-class.html>
5. <https://www.kindsonthegenius.com/cplusplus/c-string-manipulation/>.



## **BCA 15 THEORY OF COMPUTER SCIENCE**

**Block 1 : Set, Relations and Functions** : Sets – Notation and description of sets – subsets – operations on sets – Properties of set operations – Relations : Representation of a relation – Operations on Relations – Equivalence Relation Partitions and Equivalence Classes. Functions : Definition – One to one – Onto functions – Special type of functions – Invertible and composition of functions.

**Block 2 : Logic** : Introduction – Connectives – Statements : Atomic – Compound – Well formed – Truth Table – Tautology – Tautological implications and equivalence of formulae – Replacement Process – Normal forms – Principal Normal forms – Theory of Inference – Quantifiers – Theory of Inference for Propositional and predicate calculus.

**Block 3 : Finite Automata and Languages** : Definition – Representation of FA – Languages Accepted by FA - Non-deterministic Finite Automata – Regular Sets – Phase structure grammar – Context free grammar – Context free language – Finite Automata and regular languages – Turing Machines – Techniques for Turing Machine construction

**Block 4 : Graph theory** : Basic concepts – definition – paths – reach – ability and connectedness – matrix representation of graphs – trees.

Reference Books:

1. Discrete mathematical structures with applications to computer science by J.P.Tremblay and R.Manohar, McGraw Hill.
2. Discrete Mathematics by M.K.Venkatraman, N.Sridharan and N.Chandrasekaran. National publishing company, 2000.

Web Links

1. <https://www.youtube.com/watch?v=UG2KDit1xjM>
2. [https://www.youtube.com/watch?v=BEJT\\_QCrN7s](https://www.youtube.com/watch?v=BEJT_QCrN7s)
3. <https://www.youtube.com/watch?v=S90tAmeZv78>
4. <https://www.youtube.com/watch?v=9syvZr-9xwk>
5. <https://www.youtube.com/watch?v=sWsXBY19o8I>

## **BCA 16 INTRODUCTION TO INTERNET PROGRAMMING**

**Block 1 : Fundamentals of Java Programming** : Internet Programming : Introduction – Fundamentals of Java - Applets and Applications – Features of JAVA – JVM – Java API - Java libraries – Structure of a Java program - Java variables – Constants - Java data types – Operators – Keywords – Type Casting.

**Block 2 : Java Programming Constructs** : Statements : if – if else if – for – while – do while – switch case – break – continue - go to – Simple Java programs. Arrays: one dimensional – multidimensional – Initialisation of arrays – Simple programs. Classes – Objects – Constructor : default – parameterised - copy

**Block 3 : Subclassing and Exception Handling** : Subclassing – abstract class – extends keyword – instanceof operator – final keyword – static variables and methods – Access specifier – Wrapper classes – Inner classes – Simple programs - Exception Handling : Exception classes – try and catch – multiple exceptions – built-in exceptions - using finally – throw – catching exceptions – user defined exceptions –

**Block 4 : Packages and Interfaces** : Packages – creation – Adding classes to existing package – Interfaces – creation and implementation – features – Object Oriented Programming in Java - Applet Programming : Applet creation – execution – GUI creation – Designing layouts – Multithreading – Simple Programs.

#### Reference Books

1. Java 2 (Fourth Edition) by Herbert Schildt, Tata McGraw Hill.
2. An Introduction to Java Programming by Y. Daniel Lang, Prentice Hall of India.
3. Java Programming by Dr.E.Balagurusamy.

#### Web References

1. <https://www.youtube.com/watch?v=8px36FWLdDs>
2. [https://www.youtube.com/watch?v=JSHGCE5w\\_nY](https://www.youtube.com/watch?v=JSHGCE5w_nY)
3. <https://www.youtube.com/watch?v=34ttwuxHtAE>
4. <https://www.youtube.com/watch?v=34kMrUJcaI4>

## **BCA 17 INTRANET ADMINISTRATION**

**Block 1 : Intranet Fundamentals** : The Intranet – Definition – How Intranet works? – Internet Vs Intranet – Advantages of Intranet – Types of Intranet : Bulletin board – Database management – Information access – The communications Intranet – Integrating Intranet – Catalogue Intranet – Sing Sign-On Intranet – Software and Hardware requirement for Intranet – Application areas – Future of Intranet.

Intranet's Security : Security concerns – Threats – Security Solutions : Hardware – Software – Information – Certification – Firewalls – Encryption/deception methods – Security policy – Multiple Layers of Intranet security – SOCKS – Advise from Security Experts.

**Block 2** : Selection of Computing Infrastructure for Intranet – Hardware: Servers – Clients – Security Systems – Network Environment : LAN – Address Translation – Firewall – Software : Operating System – Groupware – Database connectivity - ODBC – JDBC – Other Aspects: Protocol Support Tools – Web based Tools : HTML, XML, CGI – Web authoring tools – Security tools: Firewalls – Virtual Private Network – Encryption/decryption using by SSL.

**Block 3 : Configuring Intranet** : Web authoring Preview – Web graphics – Adding Interactivity – Installation : Network installation and administration – User management – Disk quotas – Security configuration and Analysis – Account Policies – Permissions and restrictions – Tuning server performance – Configuring network settings – Networks and Security – Tuning applications over Intranet. Intranet

Authoring and Managing tools : Authoring tools : Editors – Supporting applications for service – Graphical tools for creating and animating – Management tools : Databases – basic – ODBC – distributed – Web Servers – other tools.

**Block 4 : Intranet Protocols:** Communication cum mail protocols : ARP – SMTP – POP – IMAP – Service protocols: TCP – IP – TELNET – HTTP – FTP – UDP – Web server specific protocols – CGI – ISAPI – NSAPI – DMSP – Latest protocols : CDMA – WAP – GPRS – Protocols for E-Commerce.

Reference Books :

1. David Linthicum's Guide to Client/Server and Intranet Development by David.S.Linthicum, John Wiley & Sons.
2. Intranet's Decisions : Creating your organization's internal network by Lisa Kimball, Miles River Press
3. Designing the Total Area Network: Intranets, VPN and Enterprise Networks Explained by Steve Pretty, John Wiley & Sons.

Web Links

1. <https://www.youtube.com/watch?v=BBFrm-QU8ZE>
2. <https://www.youtube.com/watch?v=AlxgoI16zdg>
3. <https://www.youtube.com/watch?v=V6zJi8CU7Tk>
4. <https://www.youtube.com/watch?v=ly8ikWtAY7s>

## **BCA 18 MANAGEMENT PRINCIPLES AND TECHNIQUES**

**Block 1 : Management Principle :** Concept – Definition of Management – Management functions – Planning : Definition - Planning process – Decision making – Organization : Structure - Delegation – Staffing – Direction – Communication - Motivation – Leadership - Control.

**Block 2 : Linear Programming :** History of Operations Research - Meaning of OR – Application of OR - Principles of modeling – Formulation of LP models – Graphical solution – Algebraic solutions – Simplex method : Feasibility – Optimality – Artificial variables – Duality of LP – Dual Simplex Algorithm – Transportation Problem – Finding optimal solution – Assignment problem.

**Block 3 : PERT/CPM :** Network diagram – Representation – Time estimation – Critical path – Floats – Construction of time chart – Resource leveling – Probability and cost consideration in project scheduling – Project control.

**Block 4 : Replacement Theory :** Concepts – Replacement situations – Replacement policies – Variable maintenance cost with fixed money value – Variable maintenance cost with variable money value – Individual replacement policy – Group replacement policy – Reliability.

Books for Reference :

1. Hamdy A.Taha Operations Research An Introduction Macmillan publishing company (1982)
2. Don.T.Philips, A.Ravindran, James.J.Solberg Operations Research – Principles and practice John Wiley & sons (1976).

## Web Links

1. <https://www.youtube.com/watch?v=VI0Eu5uZxXQ>
2. <https://www.youtube.com/watch?v=KIKZyHTDR5Q>
3. <https://www.youtube.com/watch?v=LdRZN5o08eM>
4. <https://www.youtube.com/watch?v=9QPyPy3ifwg>

BCA-P3: C++, Internet Programming, Java/ActiveX.

## Mapping of curriculum for Bachelor of Computer Applications

S.No		BCA-01	BCA-02	BCA-03	BCA-04	BCA-05	BCA-06	BCA-07	BCA-08	BCA-09	BCA-09	BCA-10	BCA-11	BCA-12	BCA-13	BCA-14	BCA-15	BCA-16	BCA-17	BCA-18
1	Fundamental understanding of the field	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Application of basic computing concepts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Linkages with related disciplines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Skills in related field of specialization	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Ability to use in Real time problem	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
6	Skills in Design / Solution modeling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
7	Skills in analysis and interpretation of data	✓		✓			✓	✓		✓	✓	✓	✓	✓	✓	✓		✓		✓
8	Develop investigative Skills	✓		✓	✓		✓	✓	✓	✓	✓	-	✓	✓	✓	-		-	✓	-
9	Skills in problem solving	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓			✓
10	Develop Technical Communication skills	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	-		✓	-	-