

Bilaspur University, Bilaspur, Chhattisgarh  
Syllabus of Bachelor of Computer Application (BCA Yearly System)  
w.e.f. academic session 2015-16

# **SCHEME OF EXAMINATION**

**&**

# **DETAILED SYLLABUS**

**For**

**BACHELOR OF COMPUTER APPLICATIONS  
(BCA) DEGREE – Part II**



# **BILASPUR UNIVERSITY**

**Bilaspur, Chhattisgarh**

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**BCA II<sup>nd</sup> YEAR**

BCAYT-201	Operating System	Theory	100	33
BCAYT-202	Digital Electronics and Microprocessor	Theory	100	33
BCAYT-203	Computer Networks and Cyber Technology	Theory	100	33
BCAYT-204	Object Oriented Programming Using C++	Theory	100	33
BCAYT-205	Computer Graphics and Multimedia	Theory	100	33
BCAYP-206	Programming Lab Using C++	Practical	75	25
BCAYP-207	Multimedia Lab	Practical	75	25
<b>Total Marks BCA 2<sup>nd</sup> Year Examination</b>			<b>650</b>	

## **BCAYT-201**

### **Operating System**

#### **Unit – I**

##### **Introduction to Operating System**

What is an Operating System, Operating Systems Architecture, Operating Systems as an Extended Machine & Resource Manager, Process Model, Process States and Transitions, Types of System Calls, System Boot, Multi-Programming, Multi-Tasking, Multi-Threading; Operating Systems Classification: Simple Batch Systems, Multi-programmed Batches systems, Time-Sharing Systems, Parallel & Distributed Operating Systems.

#### **Unit – II**

##### **Process Management**

Processes: Process Scheduling, Cooperating Processes, Inter-process Communication, Threads, CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple- Processor Scheduling, Process Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Recovery from Deadlock, Combined Approach to Deadlock Handling.

#### **Unit –III**

##### **Memory Management**

Main Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging, Virtual Memory: Demand Paging, Page Replacement, Page replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Demand Segmentation.

#### **Unit –IV**

##### **Device and Storage Management**

File-System Interface, Mass-Storage Structure, Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Buffering, Multiple Paths, Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management.

#### **Unit –V**

##### **File-System Implementation**

A Simple File System, Logical & Physical File System, File-System Interface: Access Methods, Directory Structure, Protection, Free-Space Management, Directory Implementation.

#### **Text Books:**

1. Operating System Concepts, Silberschatz and Galvin, Pearson Education Pub.
2. Operating Systems, Madnick E., Donovan J., Tata McGraw Hill,
3. Operating Systems, A. S. Tannenbaum, PHI

#### **Reference Books:**

1. Operating Systems Internals and Design Principle, William Stallings, Prentice Hall Publishers
2. Operating Systems- A Concept-Based Approach, Dhananjay M. Dhamdhare, McGraw-Hill

## **BCAYT-202**

### **Digital Electronics and Microprocessor**

#### **Unit – I**

##### **Background of Digital Electronics**

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Digital Signals, Different Type of Numbering Systems: Decimal, Octal, Binary, Hexadecimal, Conversion from one number system to another number system, Binary Math: Binary Addition, Binary Subtraction, Binary Complements, One's & Two's Complement, Binary Subtraction using Two's Complement, Signed Magnitude, Floating Point Binary, IEEE Standard 754 Floating-Point Formats, Logic Gate Basics: NOT Gate, AND Gate, OR Gate, Exclusive-OR (XOR) Gate, Truth Tables for Logic Gates, Truth Tables for Combinational Logic.

#### **Unit – II**

##### **Logic Families**

Introduction to Semiconductor, Fundamentals of Semiconductor Devices, Diode and Transistor Characteristics, Diode And Transistor As A Switch, Evolution of Logic Gates, Types of Logic Family: Circuit of RTL, DTL, TTL and Working Function as a Gate, Emitter Coupled Logic (ECL), CMOS Logic Family, NMOS and PMOS Logic, Comparison of Different Logic Families.

#### **Unit – III**

##### **Boolean Algebra and Karnaugh Maps**

Boolean Algebra, Boolean Expressions of Combinational Logic, Laws of Boolean Algebra, Rules of Boolean Algebra: NOT Rule, OR Rules, AND Rules, XOR Rules, Derivation of Other Rules, Simplification, DeMorgan's Theorem, Boolean Expression Formats: Sum-of-Products, Product-of-Sums, Converting SOP & POS to Truth Table & Truth Table to Expression, Karnaugh Maps, Minimization techniques of Boolean Expression using K-Maps, "Don't Care" Conditions, Minimization of Multiple Output Boolean Functions, VEM Theory of K-Map, MEV and Minimization of Two, Three, Four, Five and Six Variable Maps using VEM.

#### **Unit – IV**

##### **Combinational and Sequential Circuit**

Creation of Different Combinational Circuits using K-Map: Adders, Seven-Segment Displays Circuits, BCD to Gray code Convertor, BCD to Ex-3 code Convertor, BCD to 84-2-1 code converter, Digital Comparator and other Combinational Circuit, Carry Propagation–Look-Ahead Carry Generator, Decoders, Multiplexers, De-multiplexers, State Machine Design Process: Mealy Versus Moore State Machines, S-R Latch/ Flip-Flop, D Latch, J-K Flip-Flop, Divide-By-Two Circuit, Registers, Counter: Ripple (Asynchronous) Counter and Synchronous Counter, UP/DOWN Counters, Design of Synchronous Counter using K-Map.

#### **Unit – V**

##### **Fundamentals of Microprocessor**

What is Microprocessor, Evolution of Microprocessor, Various Microprocessor Families and Examples, Generic Architecture of Microprocessor, Pin Diagram & Pin Functions of Intel 8085 Microprocessor, Instruction Set for Microprocessor, Definition and Need of Addressing mode, Addressing modes of Intel 8085 & 8086 Microprocessor, Machine Cycle and Instruction Cycle of Microprocessor, Working of Microprocessor.

##### **Text Books:**

1. Modern Digital Electronics, R.P. Jain, TMH
2. Digital Principles & Application, Leach & Malvino, TMH
3. Digital Logic Design, Morris Mano, PHI
4. Digital design- Principles and Practices, J. F. Wakerly, Pearson India.
5. Microprocessor - Architecture, Programming and Applications with the 8085", Ramesh S.Gaonkar, PHI.
6. The 8085A Microprocessor software, programming and Architecture, Barry B.Bray, PHI

##### **Reference Books:**

1. Digital Integrated Electronics, H.Taub & D. Shilling, McGraw Hill.
2. Digital Principles & Design, Givone, TMH

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3. Digital Circuit & Design, S. Aligahanan, S. Aribazhagan, Bikas Publishing House.
4. Fundamentals of Digital Electronics & Microprocessor, Anokh Singh, A.K. Chhabra, S. Chand
5. Digital circuits and Logic Design, Samuel Lee, PHI publication

## BCAYT-203

### Computer Networks and Cyber Technology

#### Unit – I

##### Introduction to Computer Network and Physical Layer

Computer network Fundamentals and Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, ISO-OSI reference model, TCP/IP model, Concept of Analog & Digital Signal, Bandwidth, Multiplexing: TDM, FDM, WDM, CDMA, Transmission Media : Twisted pair, Coaxial cable, Fiber-optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching, Packet Switching & their comparisons, Line Coding techniques: Bipolar, Unipolar, RZ, NRZ, Manchester, AMI, B8ZS, Block coding techniques.

#### Unit –II

##### Data Link Layer

Functions at Data Link Layer, Framing, Error detection and correction codes: checksum, CRC, hamming code, Flow Control: Stop & Wait and Sliding Window Protocols, Data link protocols: HDLC and PPP, Medium Access Sub-Layer: LLC Protocol, IEEE 802.2, Overview of IEEE 802.3, 802.4, 802.5, 802.6 and brief knowledge of 802 series up to present scenario.

#### Unit –III

##### Network Layer and Transport Layer

Functions of Network Layer, Routing Protocols & Algorithms, Principles of Congestion Control, IPv4 addresses, IPv4 Addressing, IPv6 addresses, Internetworking basics, Functions of Transport Layer, Flow Control & Buffering, Introduction to TCP/UDP protocols and their comparison.

#### Unit –IV

##### Common Network Architecture

Protocol Stack for Example Networks, Connection oriented & Connectionless N/Ws, Frame Relay, Example of N/Ws-P2P, X.25, ATM, Ethernet, Wireless LANs - 802.11, 802.11x, Gigabit, Broad Band Networks: Integrated Service Digital Networks (ISDN), Broad Band ISDN, ATM, Introduction to Very Small Aperture Terminal (VSAT).

#### Unit –V

##### Application Layer

World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP), Email Protocols: MIME & SMTP, POP, IMAP, Telnet – Remote Communication Protocol, Proxy Server, Proxy Web Servers.

#### Cyber Laws in India

Information Technology Act, 2000 – a brief overview; E – commerce; E – governance; Concept of Electronic Signature; Concept of Cyber contraventions and Cyber Offences, IT Act, 2000.

#### Text Books:

1. Computer Networks, Andrew S. Tanenbaum, PHI / Pearson Education Inc.,
2. Data Communication and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
3. Internet Law-Text and Materials, Chris Reed, Universal Law Publishing Co., New Delhi
4. Hand book of Cyber Laws, Vakul Sharma, Macmillan India Ltd, New Delhi

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**Reference Books:**

1. Data and Computer Communication, William Stallings, Pearson Education.
2. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007.
3. Data & Computer Communication, Black, PHI.

**BCAYT-204**

**Object Oriented Programming Using C++**

**Unit-I**

Features of C++, OOP vs. procedure-oriented programming, OOP Concepts: Abstraction, Inheritance, Polymorphism, Data Binding, Encapsulation, Classes, subclasses and Objects; Basics of C++: Data Types and sizes, Variable, Constants and its types, Use of << and >> operators, Operators and Expressions: Operators:-Arithmetic, Relational, Assignment, Logical, Increment and Decrement Operators (++ and --), 'Operate-Assign' Operators (+=, \*=, ...); Expressions, Operator Precedence, Precedence and Order of Evaluation, Conditional Expression, Casting and type conversion.

**Unit-II**

Program Flow & Decision Control: if, if – else, if - else if, Loop Control: while, do – while, for, break, continue, Case Control: switch, goto; Functions/Procedures, Returning values from functions, Arguments Passed by Value, Passing Addresses of Arguments, Pointers and Arrays: Pointer Initialization, Pointer Operators, Pointer Arithmetic, Functions and pointers, Arrays, Initializing Arrays, Passing Arrays to Functions, Pointers and Arrays, Pointer to an Array, Array of pointers, Strings: String I/O, Arrays of Strings, Structures, Arrays of Structures.

**Unit-III**

Binding Data & Functions: Defining a Class, Creating an Object, Scope, Data Abstraction, Data Encapsulation, 'this' Pointer, Dynamic Creation of Objects, Constructors and Destructors: Parameterized & Copy constructor, Member Functions & Methods, Friend Class and Friendly Functions, Returning Objects, Arrays of Objects.

**Unit-IV**

Function and Operator Overloading, Rules for Overloading, Operator overloading and its uses: Overloading unary and binary operators, Overloading the Assignment Operator, Overloading the << Operator, Overloading the Increment & Decrement Operator, Converting data types: Basic to class type, Class to Basic Type, Class to Another Class Type.

**Unit-V**

Reusing Classes: Inheritance-Base and Derived classes, Inheritance types, Scope Resolution Operator, Access Modifiers, Multiple & Multilevel Inheritance, Calling Base Class Constructor, Overriding Base Class Members, Virtual functions and Polymorphism: Virtual & non-virtual Overriding, Rules for Virtual Functions, Pure Virtual Functions, Static and Dynamic Binding, Virtual Base Classes, Templates, Exception Handling, Throwing an exception.

**Text books:**

1. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
2. Object Oriented Programming in C++, 4th Edition, R.Lafore, SAMS, Pearson Education

**Reference Books:**

1. An Introduction to OOP, 3rd Edition, T. Budd, Pearson Education, 2008.
2. Programming Principles and Practice Using C++, B.Stroutstrup, Addison- Wesley, Pearson Education.
3. Problem solving with C++, 6th Edition, Walter Savitch, Pearson Education, 2007..
4. The Art, Philosophy and Science of OOP with C++, R.Miller, SPD.

## **BCAYT-205**

### **Computer Graphics and Multimedia**

#### **Unit-I**

##### **An Introduction Graphics System**

Computer Graphics Fundamentals, Application of Computer Graphics, Video Display Devices, Raster & Random Scan Systems, Input Devices, Graphics Software, Interactive devices, Output Primitives, Line Drawing & Circle Generating Algorithms, Scan-Line Polygon Fill Algorithm, Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm.

#### **Unit-II**

##### **2D Transformations**

2-D Viewing and Clipping: Viewing Transformations, Point Clipping & Line Clipping Algorithms, Polygon Clipping algorithms, 2D Geometric Transformations: Basic transformations (Translation, Rotation, Scaling), Matrix Representation & Homogeneous Coordinates, Composite transformations, Reflection and Shear.

#### **Unit-III**

##### **3D transformations**

3D Viewing Transformation, Projections: Parallel Projection (Orthographic & Oblique Projections, Isometric Projections), Perspective Projections, 3D Geometric Transformations: Translation, Rotation, Scaling, Matrix Representation, 3D Object Representations: Polygon Surface and Polygon table, Bezier curves and surfaces.

#### **Unit-IV**

##### **Multimedia and Photoshop s/w**

Fundamentals of Multimedia, Adobe Photoshop CS4: Menus and panels, Exploring the Toolbox, Working with Images: Working with Multiple Images, Rulers, Guides & Grids, Image Size Command, Adjusting Canvas Size & Canvas Rotation, Creating, Selecting, Linking & Deleting Layers, Painting with Selections, Red Eye Tool, Clone Stamp Tool, Color creation, Quick Mask Options, Creating Straight & Curved Paths, Creating Special Effects.

#### **Unit-V**

##### **CorelDraw X4**

CorelDraw X4 Command Bars & Tools, Drawing Area-Objects-Lines, Working with Text & Artistic Media Tool, Fills & Modifying Outlines, Drop Shadows, Importing and Editing OCR Text, Templates, Drawing and Editing Curves and Lines, Three-point Tools, Clipart, Special Characters and Creating Symbols, Working with Layers & Creating a Master Layer, Brush Tools and Adding Objects, Interactive Tools, PowerClip Feature and the Envelope Tool.

##### **Text Books:**

1. Procedural Elements for Computer Graphics, D.F. Rogers, Tata McGraw Hill
2. Fundamentals of Interactive Computer Graphics, J.D. Foley and A.D. Van, Addison-Wesley.
3. How to Do Everything Adobe Photoshop CS4, Chad Perkins, Tata McGraw Hill
4. Corel Draw X4: The Official Guide, (Paperback), Gary David Bouton, Tata McGraw Hill

##### **Reference Books:**

1. Photoshop CS4 Quicksteps, Carole Matthews & Gary David Bouton, Tata McGraw Hill
2. CorelDRAW X4, Deborah Miller, Pearson Education
3. Coreldraw X5 In Simple Steps, Hindi Ed., ISBN : 9789350042885, Kogent, Wiley Publications
4. Mathematical Elements for Computer Graphics,, Rogers and Adam, Tata McGraw Hill.
5. Theory & Problem of Computer Graphics, Plastock, Schaum Series.
6. Computer Graphics, Tosijas, L.K., Springer-verleg
7. Principles of Interactive Computer Graphics, Newman, Tata McGraw Hill.

## **BCAYP-206**

### **Programming Lab Using C++**

#### **List of Sample Problems/Experiments:**

1. Write a C++ program to find the sum of individual digits of a positive integer.
2. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C++ program to generate the first n terms of the sequence.
3. Write a C++ program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.
4. Write C++ programs that use both recursive and non-recursive functions
  - a. To find the factorial of a given integer.
  - b. To find the GCD of two given integers.
  - c. To find the nth Fibonacci number.
5. Write a C++ program that uses a recursive function for solving Towers of Hanoi problem.
6. Write a C++ program to find both the largest and smallest number in a list of integers.
7. Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:
  - a) Reading a matrix.
  - c) Addition of matrices.
  - b) Printing a matrix.
  - d) Subtraction of matrices.
  - e) Multiplication of matrices.

**Note: Practical must be as per syllabus of theoretical paper BCAT-401.**

## **BCAYP-207**

### **Multimedia Lab**

#### **Series of Practical Curriculum**

##### **Photoshop:**

1. (i) Handling different file formats and interchanging them, changing the resolution, color, grayscales and size of the images
- (ii) Using brushes and creating multicolor real life images
2. Cropping, rotating, overlapping, superimposing, pasting photos on a page
3. Creation of a single image from selected portions of many
4. Developing a commercial brochure with background tints
5. Creating an image with multi-layers of images and texts.
6. Applying masks and filtering on images

##### **7. CorelDRAW X4 Part 1**

- Getting Started with CorelDRAW
- Starting CorelDRAW
- Working with Command Bars
- Working with Layers
- Examining a Master Page
- Creating a Master Layer
- Working with Layers
- Using Brush Tools and Adding Objects
- Working with Interactive Tools
- Using Advanced Techniques for Text Manipulation



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- Working with Paragraph Text
- The PowerClip Feature and the Envelope Tool
- Creating Bulleted Lists
- Working with Vector and Bitmap Graphics
- Converting Vector Objects to Bitmaps
- Working with Bitmap Graphics
- Introduction to CorelTRACE
- Advanced Output Options
- Preparing a Document For Printing
- Other Printing Options

The break-up of marks for Fourth Year's Practical will be as under :			
Sr. No.	Argument	Maximum Marks	Minimum Passing Marks
1.	Lab Record	15	
2.	Viva-voce	20	
3.	Program Development and Execution	40	
Total Marks		75	25

\*\*\*\*\* **Second Year**\*\*\*\*\*