<table>
<thead>
<tr>
<th>Paper No.</th>
<th>Title of Paper</th>
<th>External Marks</th>
<th>Internal Assessment</th>
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<th>Pass Marks</th>
<th>Exam Duration</th>
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<tr>
<td>BCA-351</td>
<td>Introduction to Object oriented</td>
<td>90</td>
<td>10</td>
<td>100</td>
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<td></td>
<td>Programming</td>
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**Semester - VI**

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BCA – 351  INTRODUCTION TO OBJECT ORIENTED PROGRAMMING

Maximum Marks: 100       External: 90
Minimum Pass Marks: 35       Internal: 10
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I
Object oriented Programming: Object-Oriented programming features and benefits. Object-Oriented features of C++, Class and Objects, Data Hiding & Encapsulation, Structures, Data members and Member functions, Static Data Members and Member Functions, Nested and Local Class, Accessing Members of Class and Structure, Preprocessor Directives, Namespace.

UNIT – II

UNIT – III

UNIT – IV

TEXT BOOKS:
2. Robert Lafore, Object Oriented Programming in C++

REFERENCE BOOKS:
UNIT – I
Introductory Concepts: Operating system functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service system calls, system programs.

UNIT – II
CPU Scheduling: Scheduling criteria, Levels of Scheduling, Scheduling algorithms, Multiple processor scheduling.
Deadlocks: Deadlock characterization, Deadlock prevention and avoidance, Deadlock detection and recovery, practical considerations.

UNIT – III
Storage Management: memory management of single-user and multiuser operating system, partitioning, swapping, paging and segmentation, virtual memory, Page replacement Algorithms, Thrashing.

UNIT – IV

TEXT BOOKS:

REFERENCE BOOKS:
BCA – 353  SOFTWARE ENGINEERING

Maximum Marks: 100       External: 90
Minimum Pass Marks: 35       Internal: 10
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I
Software Crisis – problem and causes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models.
Software Project Planning: Cost estimation: COCOMO model, Putnam Resource Allocation Model, Risk management, project scheduling, personnel planning, team structure, Software configuration management, quality assurance, project monitoring.

UNIT – II
Software Design: Design fundamentals, problem partitioning and abstraction, design methodology, Cohesion & Coupling, Classification of Cohesiveness & Coupling.

UNIT – III
Coding: Programming style, structured programming.
Software Testing: Testing fundamentals, Functional testing: Boundary Value Analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Control flow based and data flow based testing, loop testing;

UNIT – IV
Software testing strategies: unit testing, integration testing, Validation testing, System testing, Alpha and Beta testing.
Software Maintenance: Type of maintenance, Management of Maintenance, Maintenance Process, maintenance characteristics.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT – I
Introduction to Computer Communications and Networking Technologies; Uses of Computer Networks; Network Devices, Nodes, and Hosts; Types of Computer Networks and their Topologies; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; Network Applications and Application Protocols; Computer Communications and Networking Models: Decentralized and Centralized Systems, Distributed Systems, Client/Server Model, Peer-to-Peer Model, Web-Based Model, Network Architecture and the OSI Reference Model; Example Networks: The Internet, X.25, Frame Relay, ATM;

UNIT – II
Analog and Digital Communications Concepts: Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth, Capacity, Baud Rate; Digital Carrier Systems; Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Dialup Networking; Analog Modem Concepts; DSL Service;

UNIT - III
Data Link Layer: Framing, Flow Control, Error Control; Error Detection and Correction; Sliding Window Protocols; Media Access Control: Random Access Protocols, Token Passing Protocols; Token Ring; Introduction to LAN technologies: Ethernet, switched Ethernet, VLAN, fast Ethernet, gigabit Ethernet, token ring, FDDI, Wireless LANs; Bluetooth;

Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways;

UNIT – IV
Network Layer and Routing Concepts: Virtual Circuits and Datagrams; Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing, Hierarchical Routing; Congestion Control Algorithms; Internetworking;
Network Security Issues: Security threats; Encryption Methods; Authentication; Symmetric – Key Algorithms; Public-Key Algorithms;

TEXT BOOKS:
REFERENCE BOOKS:
BCA – 355 COMPUTER GRAPHICS

Maximum Marks: 100
Minimum Pass Marks: 35
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I
Overview of Computer Graphics: Historical background of Computer Graphics; Applications of Computer Graphics; Popular Graphics Softwares; Display devices: Pixel, Resolution, Aspect Ratio; Raster-Scan Systems and Display: CRT, Refresh Rate and Interlacing; Bit Planes, Color Depth and Color Palette, Frame Buffer, Video Controller, Raster-Scan Display Processor, Lookup Table, RGB Color Model, Color CRT monitors; Random-Scan Displays; Flat Panel Display: LCD, Plasma Panel; Graphics Monitors and Workstations; Popular Graphics Input Devices; Hard-Copy Devices;

UNIT – II
Coordinate Representations; Graphics Primitives: Line Drawing Algorithms- DDA Algorithm, Bresenham’s Algorithm; Different Line Styles; Circle-Generating Algorithms- Properties of Circles, Circle Drawing using Polar Coordinates, Bresenham’s Circle Drawing Algorithm; Ellipse-Generating Algorithms; Anti-aliasing;

UNIT – III
Geometric Transformations: Scaling, Translation, Rotation; Matrix Representations and Homogeneous Coordinates; Rotation Relative to an Arbitrary Point; Reflection; Shearing; Coordinate Transformation; Inverse Transformation; Affine Transformation; Raster Transformation; Composite Transformations; Fixed-point Scaling; Input Techniques: Pointing, Positioning, Rubber-band method, Dragging;

UNIT – IV
Two-Dimensional Viewing: Window-to-Viewport Coordinate Transformation; Zooming; Panning; Clipping; Point Clipping, Line Clipping- Cohen-Sutherland line clipping, Mid-point Subdivision Line Clipping; Polygon Clipping – Sutherland-Hodgeman Polygon Clipping; Text Clipping; Graphics in Three Dimensions: Displays in Three Dimensions, 3-D Transformations; 3-D Viewing: Viewing Parameters, Projections, Parallel and Perspective projection; Hidden Surfaces: Z-Buffer Method, Painter’s Algorithm;

TEXT BOOKS:

REFERENCE BOOKS:
Maximum Marks: 100       External: 90
Minimum Pass Marks: 35       Internal: 10
Time: 3 hours

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**UNIT – I**
Brief Introduction to Interactivity tools: CGI; Features of Java; Java Script; Features of ASP; VBScript; Macromedia Flash; Macromedia Dreamweaver; PHP;

**UNIT – II**
Introduction and Features of Adobe Photoshop; Microsoft FrontPage Introduction; Features; Title Bar; Menu bar; FrontPage Tool Bar; Style, FontFace and Formatting Bar; Scroll Bars;

**UNIT – III**
Introduction to DHTML and its features; Events; Cascading Style Sheets: Creating Style Sheets; Common Tasks with CSS: Text, Fonts, Margins, Links, Tables, Colors; Marquee; Mouseovers; Filters and Transitions; Adding Links; Adding Tables; Adding Forms; Adding Image and Sound;

**UNIT – IV**
Extensible Mark-up Language (XML): Introduction; Features; XML Support and Usage; Structure of XML Documents; Structures in XML; Creating Document Type Declarations; Flow Objects; Working with Text and Font; Color and Background properties;

**TEXT BOOKS:**
1. Internet and Web Technologies, Raj Kamal, Tata McGraw-Hill.
3. Internet and Web Design, ITI/ESL Research and Development Wing, Macmillan India.

**REFERENCE BOOKS:**
2. Internet and World Wide Web, How to Program, Deitel and Goldberg, PHI.
BCA – 361 PROGRAMMING IN ‘C++’

Maximum Marks: 100       External: 90
Minimum Pass Marks: 35       Internal: 10
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I

UNIT – II
Type Conversion: Basic Type Conversion, Conversion Between Objects And Basic Types, Conversion Between Objects Of Different Classes.

UNIT – III
Genericity in C++: Template Function, Template Class, Inheritance and Templates.
Exception Handling: try, throw and catch constructs, rethrowing an exception, catch all Handlers.

UNIT – IV
Files I/O in C++: Class Hierarchy for Files I/O, Text versus Binary Files, Opening and Closing Files, File Pointers, Manipulators and Error Handling.

TEXT BOOKS:
2. Robert Lafore, Object Oriented Programming in C++

REFERENCE BOOKS:
BCA – 362  INTRODUCTION TO LINUX

Maximum Marks: 100
Minimum Pass Marks: 35
Time: 3 hours

External: 90
Internal: 10

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I
Introduction to Linux: Linux distributions, Overview of Linux operating system, Linux architecture, Features of Linux, Accessing Linux system, Starting and shutting down system, Logging in and Logging out. Comparison of Linux with other operating systems.

UNIT – II
Commands in Linux: General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands, etc. Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, grep. Introducing regular expressions.

UNIT – III
Linux file system: Linux files, inodes and structure and file system, file system components, standard file system, file system types. Processes in Linux: starting and stopping processes, initialization Processes, mechanism of process creation, Job control in linux using at, batch, cron & time.

UNIT – IV
Shell Programming: VI editor, shell variables, I/O in shell, control structures, loops, subprograms, creating & executing shell scripts in linux.

TEXT BOOKS:
1. Yashwant Kanetkar, UNIX & Shell programming – BPB.
2. M.G.Venkateshmurthy, Introduction to UNIX & Shell Programming, Pearson Education.

REFERENCE BOOKS:
Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I
Internet and TCP/IP: Introduction to the Internet; Internet History, Internet Administration; Internet and Intranet; Internet Services; TCP/IP model and its protocols; IP addresses: IPv4; Subnetting IPv4 addresses; Supernetting; Next generation Internet Protocol (IPv6); The need for IPv6; Packet Format; IPv6 Addresses; Extension Headers;

UNIT – II
TCP/IPs Transport and Network Layer Protocols: Role of TCP, UDP, IP, and Port numbers; Format of TCP, UDP and IP; TCP services; TCP connection management; Remote Procedure Call; SCTP; IP address resolution- DNS; Domain Name Space; DNS mapping; Recursive and Iterative resolution; Resource records; Mapping Internet Addresses to Physical Addresses; ARP, RARP, BOOTP, DHCP; ICMP; IGMP;

UNIT – III
TCP/IP Application Level Protocols: Electronic Mail: Architecture; SMTP, MIME, POP, IMAP; Web Based Mail; File Access and Transfer: FTP, Anonymous FTP, TFTP, NFS; Remote Login using TELNET; Voice and Video over IP: RTP, RTCP, IP Telephony and Signaling, Resource Reservation and Quality of Service, RSVP;

UNIT – IV
Routing in Internet: RIP, OSPF, BGP; Internet Multicasting; Mobile IP; Private Network Interconnection: Network Address Translation (NAT), Virtual Private Network (VPN); Internet Management: SNMP; Internet Security: IPSec, E-Mail Security; Web Security; Firewalls; Digital Signatures; Certificates;

TEXT BOOKS

REFERENCE BOOKS:
4. “Introduction to Data Communications and Networking”, Wayne Tomasi, Pearson Education.
BCA – 364  VISUAL BASIC

Maximum Marks: 100  External: 90
Minimum Pass Marks: 35  Internal: 10
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
Programming with VB: Procedures: General & event procedures, Subroutines, Functions, Calling procedures, Arguments- passing mechanisms, Optional arguments, Named arguments, Functions returning custom data types, Functions returning arrays. Working with forms: Adding multiple forms in VB, Hiding & showing forms, Load & unload statements, Activate & deactivate events, Form-load event, menu designing in VB. Simple programs in VB.

TEXT BOOKS:

REFERENCE BOOKS:
BCA – 365 MULTIMEDIA TECHNOLOGY

Maximum Marks: 100  
Minimum Pass Marks: 35  
Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I
Introduction to Multimedia: Components of Multimedia; Hypermedia and Multimedia; Overview of Multimedia Software Tools; Multimedia Hardware and Software; Basic Software Tools; Making Instant Multimedia; Presentation Tools; Multimedia Authoring; Types of Authoring Tools; Card- and Page-Based Authoring Tools; Icon-Based Authoring Tools; Time-Based Authoring Tools; Object-Oriented Authoring Tools; VRML;

UNIT – II
Graphics and Image Data Representation: Graphics/Image Data Types, Popular File Formats; Color Models in Images and Video; Types of Video Signals; Analog and Digital Video: Broadcast Video Standards: NTSC, PAL, SECAM, HDTV; Chroma Subsampling; CCIR Standards for Digital Video;

UNIT – III
Digital Audio: Digitization of Sound; MIDI Versus Digital Audio; Quantization and Transmission of Audio: Coding of Audio; Pulse Code Modulation; Differential Coding of Audio; Lossless Predictive Coding; DPCM; DM; ADPCM;

UNIT – IV
Multimedia Data Compression: Run-Length Coding; Variable-Length Coding; Dictionary-Based Coding; Transform Coding; Image Compression Standards – JPEG standard; Video Compression Techniques: H.261, H.263, MPEG;

TEXT BOOKS:

REFERENCE BOOKS:
Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I

UNIT – II
Introduction to C#: Characteristics of C#, Data types: Value types, reference types, default value, constants, variables, scope of variables, boxing and unboxing.

UNIT – III
Operators and expressions: Arithmetic, relational, logical, bitwise, special operators, evolution of expressions, operator precedence & associativity.
Control constructs in C#: Decision making, loops.
Classes & methods: Class, methods, constructors, destructors, overloading of operators & functions.

UNIT – IV
Inheritance & polymorphism: visibility control, overriding, abstract class & methods, sealed classes & methods, interfaces.
Advanced features of C#: Exception handling & error handling, automatic memory management, Input and output (Directories, Files, and streams).

TEXT BOOKS:
1. Introduction to C# using .NET By Robert J. Oberg, PHI, 2002.
2. Programming in C# By E. Balaguruswamy, Tata McGraw Hill

REFERENCES BOOKS:
1. The Complete Guide to C# Programming by V. P. Jain