

### BCA-Part-I Semester Wise Scheme

#### Courses of Studies for BCA-I Year

##### Semester - I ( Theory : 300, Practical : 100)

Course	Theory Max. Marks	Practical Max. Marks	Max. Marks	Min Marks
BCA-101 Introduction to Information Technology FOCs 4 IT	50	-	50	17
BCA-102 Programming and Problem Solving in C	50	-	50	17
BCA-103 Mathematical Foundations of Computer Science	50	-	50	17
BCA-104 PC Packages	50	-	50	17
BCA-105 Accounting and Financial Management	50	-	50	17
BCA-106 Communication Skills-I	50	-	50	17
BCA-107 Practical-I ( Based on BCA-102 )	-	50	50	17
BCA-108 Practical-II ( Based on BCA-104 )	-	50	50	17
Total Marks	300	100	400	-

##### Semester - II ( Theory : 300, Practical : 100)

Course	Theory Max. Marks	Practical Max. Marks	Max. Marks	Min Marks
BCA-201 Operating Systems	50	-	50	17
BCA-202 Advanced Programming in C with UNIX/ LINUX	50	-	50	17
BCA-203 Digital Electronics	50	-	50	17
BCA-204 Object Oriented Programming Methodology with C++	50	-	50	17
BCA-205 - Data Base Management System	50	-	50	17
BCA-206 Principles of Management & Managerial Economics	50	-	50	17
BCA-207 Practical-I ( Based on BCA-202 )	-	50	50	17
BCA-207 Practical-I ( Based on BCA-204 )	-	50	50	17
Total Marks	300	100	400	-

Semester III

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### BCA-Part-II Semester Wise Scheme

#### Courses of Studies for BCA-II Year

**Semester – III ( Theory : 300, Practical : 100)**

Course	Theory Max. Marks	Practical Max. Marks	Max. Marks	Min Marks
BCA-301 Data Structures	50	-	50	17
BCA-302 Internet and E-Commerce	50	-	50	17
BCA-303 Information System Design and Implementation	50	-	50	17
BCA-304 Data Communication and Computer Networks	50	-	50	17
BCA-305 Computer Graphics & Multimedia	50	-	50	17
BCA-306 Communication Skills -II	50	-	50	17
BCA-307-Practical-I (Based on BCA-301 )	-	50	50	17
BCA-308-Practical-II (Based on BCA-305 )	-	50	50	17
Total Marks	300	100	400	-

**Semester – IV ( Theory : 300, Practical : 200)**

Course	Theory Max. Marks	Practical Max. Marks	Max. Marks	Min Marks
BCA-401 Programming with Visual Basic	50	-	50	17
BCA-402 Systems Analysis and Design	50	-	50	17
BCA-403 Artificial Intelligence & Expert Systems	50	-	50	17
BCA- 404 RDBMS Using ORACLE	50	-	50	17
BCA-405 Enterprise Resource Planning	50	-	50	17
BCA-406 Organizational Behavior	50	-	50	17
BCA-407-Practical-I (Based on BCA-401 )	-	50	50	17
BCA-408-Practical-II (Based on BCA-404 )	-	50	50	17
BCA-409-Minor Project-I ( Either Based BCA-401 or BCA-404 )	-	100	100	33
Total Marks	300	200	500	-

### **BCA-Part-III Semester Wise Scheme**

#### **Courses of Studies for BCA-III Year**

##### **Semester – V ( Theory : 250, Practical : 250)**

Course	Theory Max. Marks	Practical Max. Marks	Max. Marks	Min Marks
<b>BCA-501 Software Engineering</b>	50	-	50	17
<b>BCA-502 Programming With JAVA</b>	50	-	50	17
<b>BCA-503 Microprocessor and Interfacing</b>	50	-	50	17
<b>BCA-504 Internet Technology with ASP.NET and C#</b>	50	-	50	17
<b>BCA-505 Software Testing and Project Management</b>	50	-	50	17
<b>BCA-506 Practical-I ( Based on BCA-502 )</b>		50	50	17
<b>BCA-507 Practical-II ( Based on BCA-504 )</b>		50	50	17
<b>BCA-508 Minor Project-II ( Based on Either BCA-502 or BCA-504 )</b>	-	150	150	50
<b>Total Marks</b>	<b>250</b>	<b>250</b>	<b>500</b>	-

##### **Semester – VI ( Practical : 300)**

Course	Theory Max. Marks	Practical Max. Marks	Max. Marks	Min Marks
<b>BCA-601 Major Project</b>	-	300	300	100
<b>Total Marks</b>	<b>-</b>	<b>300</b>	<b>300</b>	<b>100</b>

##### **Note :**

1. For Minor Project-I and Minor Project-II and Practical Examinations kindly follow the guidelines provided in Annexure-A.
2. For Major Project (MCA-601), the marks will be allotted on the basis of performance in seminar, Viva and Demonstration separately.
3. Every student must remain present before the external examiner in Seminar and Viva and Demonstration compulsorily.
4. Max Marks in Seminar is 150 ,in Viva Max. Marks is 75 and in Demonstration Max. Marks is 75.

## CA- 101 Fundamental of Computer Science & Information Technology

Week

### UNIT I

**Computer Fundamental :** Characteristics of Computers, History of Computer, Evolution of Computers, Computer Generations, Types of Computer, Components of a Computer: Registers, Instruction Set, Bus Architecture, Computer Hardware: Input Devices, Output Devices, Storage Devices: Primary Storage capacity, Memory Types, Memory Measuring Units, Secondary Storage Device

### UNIT II

**Software and Computer Applications:** Software & Software Types, Computer Languages, Compiler, Interpreter, Editor, Computer Ethics, Computer applications, **Introduction of Programming:** Procedure Oriented Programming, Object oriented programming, Concepts used in OOP, Benefits of OOP, Main advantages and disadvantage of OOP, Applications of OOP, OOP Vs. POP.

### UNIT III

**Operating System Overview:** Computer System Startup, Computer System Structure, Computer System Components, Operating System Classifications, Operating System Services, Major Functions of Operating System, Process Management, CPU Scheduling, Scheduling Criteria, **Memory and File Management:** Memory Management Requirements, Swapping, Memory Management Techniques, Virtual Memory, File Management, File Access Methods, Protection,

### UNIT IV

**Introduction to DBMS:** File System, Traditional File Oriented Approach, DBMS- Advantages and Disadvantages, Role of DBMS, Three views of data, DBMS Architecture, Data Models, Data Independence, Major components of DBMS, Data Dictionary, Types of Users, DBMS Applications, Keys in Databases, Database Languages.

### UNIT V

**Introduction to Computer Networks:** Computer Network Definition, Importance of Networking, Types of Networks, Network Topology, Advantages and Disadvantage of Computer Networks, Applications of computer networks, Reference Model, Internet, Introduction to Internet Technology, Electronic Mail, World Wide Web.

#### Books:

1. Operating Systems Concepts, A. Silberschatz, P. Galvin, G. Gagne, John Wiley & Sons
2. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.
3. Data base management systems vol. 1., Date C.J.
4. Fundamental of Computer Science & IT, Singh Umesh Kumar, Jain S., Maheshwari A., SSDN Publications New Delhi.
5. Data Communications and Networks, Godbole A, Tata McGraw-Hill Publications.

Note: The question paper will have the usual note saying "Attempt Five questions choosing one from each unit". Thus, the paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate (numerical/conceptual/analytical/theoretical) combination of subsections of each question.

## **BCA-102 Programming and Problem Solving in C**

### **Unit-I**

Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design; Bottom-up design.

### **Unit-II**

History of C; Structure of a C Program; Data types; Constant & Variable; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

### **Unit-III**

Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion, examples.

### **Unit-IV**

Special constructs – Break, continue, exit(), goto & labels; Pointers - &and \* operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter; Structure – basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union – basic, declaration; Enumerated data type; Typedef; command line arguments.

### **Unit-V**

File handling and related functions; printf & scanf family; C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

Books :

1. Kernighan & Ritchie: The C programming language, PHI
2. Cooper Mullish: The Spirit of C, Jaico Publishing House, Delhi
3. Kanetkar Y.: Let us C
4. Kanetkar Y.: Pointers in C

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-103 Mathematical Foundations of Computer Science**

### **Unit-I**

Types of errors, Error approximation, truncation error, rounding error. Solution of transcendental equations by : Bisection, false position, Newton-Raphson Methods.

### **Unit-II**

Introduction and Approximation: Polynomial interpolation, Newton and Langranges interpolation. Approximation of function by Taylor series. Numerical integration : Simpson's one third rule, Gauss quadrature formula.

### **Unit-III**

**SETS AND RELATIONS** : Combinations of sets, finite and Infinite sets, Countable and Uncountable Infinite sets, Ordered sets. Properties of Binary Relations, Partial Ordering Relations and Lattices.

### **Unit -IV**

**FORMAL LANGUAGES AND FINITE AUTOMATA** : Regular Expressions, Finite Automata from Regular Expressions to Finite Automata, Minimizing the number of states of a DFA. Phrase Structure Grammers, Types of Grammers and Languages.

### **Unit-V**

**GRAPHS, TREES AND CUT - SETS** : Basic terminology, Multigraphs and Weighted Graphs, Paths and Circuits, Shortest Paths, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits. Rooted Trees, Path Lengths in Rooted Trees, Binary Search Trees. Spanning Trees, Minimum Spanning Trees.

#### **BOOKS :**

1. Hogg, R.V., Craig, A.L.: Introduction to mathematical statistics, American publishing co.pvt. ltd.
2. Seymour Lipschutz : Linear Albebra.
3. Computer oriented numerical analysis by S.S. Shastri.

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## BCA-104 PC Packages

### Unit – I

**MS Windows:** Introduction to M.S. Windows; Features of Windows; Various versions of Windows & its use; Working with Windows; My Computer & Recycle bin ; Desktop, Icons and Windows Explorer; Screen description & working styles of Windows; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts & Autostarts; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hardware & Software program on your computer.

### Unit – II

**Office Packages-**Office activates and their software requirements, Word-processing, Spreadsheet, Presentation graphics, Database, introduction and comparison of various office suites like MSOffice, LotusOffice, StarOffice, OpenOffice etc.

**MS Word Basics:** Introduction to MS Office; Introduction to MS- Word; Features & area of use. Working with MS Word.; Menus & Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates; Creating a New Document; Different Page Views and layouts; Applying various Text Enhancements; Working with – Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features ; Bullets, Numbering, Auto formatting, Printing & various print options.

### Unit-III

**Advanced Features of MS-Word:** Spell Check, Thesaurus, Find & Replace; Headers & Footers ; Inserting – Page Numbers, Pictures, Files, Autotexts, Symbols etc.; Working with Columns, Tabs & Indents; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Adding References and Graphics; Mail Merge, Envelops & Mailing Labels. Importing and exporting to and from various formats.

### Unit – IV

**MS Excel:** Introduction and area of use; Working with MS Excel.; concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

### Unit – V

**MS PowerPoint:** Introduction & area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects; Designing & Presentation of a Slide Show; Printing Presentations, Notes, Handouts with print options.

### Books :

1. Windows XP Complete Reference. BPB Publications
2. MS Office XP complete BPB publication
3. MS Windows XP Home edition complete, BPB Publications

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## **BCA-105 – Accounting and Financial Management**

### **Unit-I**

The basic Financial Accounts, types of accounts, Rules of Entries of transaction, Journal.Cash Book – Types, Format of Cash book, Balancing of Cash Book, Subsidiary books – Purchase, Sales, Purchase return and sales return.Ledger, posting of entries.

### **Unit-II**

Trial Balance, Rectification of errors, adjustment entries. Depreciation and Inflation.

### **Unit-III**

Principles of Cost Accounting, Valuation of Stocks, Allocation of Overheads, Methods of material issues.

### **Unit-IV**

Pay roll department, Preparation of Pay roll, Preparation of wage record, Methods of payments of wages, overview of computerized method for payroll preparation.

### **Unit-V**

Inventory account and store record, inventory or stock control and cost accounting, Department demand and supply method of stock control. Classification and condition of material Report on material handling. Overview of computerized accounting process – Introduction to accounting system software, their features and some basic operations.

#### Books :

1. *Mazda, Engineering Management, Addisen Wesley*
2. *S P Gupta, Management Accounting*
3. *I.M.Pandey, Financial Management, Vikas Publication.*

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-106 Communication Skills - I**

### **Unit-I**

Meaning and process of communication, importance of effective communication, communication situation and communication skills, barriers to communication.

### **Unit-II**

Objectives of communication, types of communication, principles of communication, essentials of effective communication.

### **Unit-III**

Media of communication: written, oral, face-to-face, visual, audio-visual, merits and demerits of written and oral communication, preparing for oral presentation, conducting presentations.

### **Unit-IV**

Developing communication skills, interview- how to face and how to conduct. Preparing of biodata, seminar, paper, bibliography, group discussion, official correspondence.

### **Unit-V**

Mechanics of writing, paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports.

### **Books :**

1. Essentials of Business Communication by Rajendra Pal nad J.S. Korlahalli, Sultan Chand & Sons Publishers, New Delhi.
2. Business Communications by U.S. Rai & S.M. Rai, Himalaya Publishing House.
3. Writing a Technical Paper by Menzal nad D.H. Jones, McGraw Hill, 1961.
4. Business Communication: Strategy and Skill, Prentice Hall New Jersey, 1987.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## BCA- II Semester

### BCA-201 Operating Systems

#### **Unit I**

Introduction to Operating Systems, Operating system services, multiprogramming, time-sharing system, storage structures, system calls, multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling I/O devices organization, I/O devices organization, I/O devices organization, I/O buffering.

#### **Unit II**

Process concept, process scheduling, operations on processes, threads, inter-process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

#### **Unit III**

Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation.

#### **Unit IV**

Concepts of virtual memory, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation. Security threads protection intruders-Viruses-trusted system.

#### **Unit V**

Disk scheduling, file concepts, file access methods, allocation methods, directory systems, file protection, introduction to distributed systems and parallel processing case study.

#### **Books**

- i. Operating System by Silberschatz
- ii. Operating System by Deitel
- iii. Modern operating system by Tanneubacem.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA- 202 Advanced Programming in C with Unix /Linux**

### **Unit-I**

Introduction and features of GNU C compiler. ANSI standards support in gcc. Feature comparison with Turbo C compiler. Advantages of using C with Linux, Compilation of C program using gcc. gcc command line options.

Basics of pointers , pointers operators, pointer arithmetic, Pointers and function, Array of pointers, Pointer and strings, Pointer to structure, Pointers within structure, Introduction – Static and Dynamic memory allocation, The process of Dynamic memory allocation, DMA functions Malloc() function, Sizeof() operator, Function free(), Function realloc()

### **Unit-II**

Introduction – File handling, File structure, File handling function, File types, Streams, Text, Binary, File system basics, The file pointer, Opening a file, Closing a file, Writing a character, Reading a character, Using fopen(),getc(), putc(), and fclose(), Using feof(), Working with string fputs() and fgets(), Standard streams in C, Flushing a stream, Using fread() and fwrite(), Direct access file, fseek() and random access I/O, fprintf() and fscanf(), getting file name as Command line arguments.

### **Unit-III**

The preprocessor, #define, defining functions like macros, #error, #include, creating header files, include user defined header files. conditional compilation directives i.e. #if, #else, #elif and #ifdef & undef, using defined, #line, #pragma, the # & ## preprocessor operator.

Error handling in C: types of errors, handling errors, debugging tools.

### **Unit-IV**

Graphics on your PC: Graphics and Text mode, Video Adapter, Initialize Graphics Mode and resolution, header file graphics.h. Functions used In Graphics - Drawing a Point on Screen, Drawing – lines, rectangle, circles, arcs, polygon. Functions to fill colors. Display Text in Graphics mode, outtext(), outtextxy(), justifying text.

### **Unit-V**

Working with ROM BIOS routines, Registers for passing arguments to BIOS ROUTINE. Function int86(), finding installed memory size and clearing screen using int86(). Working with mouse and keyboard. Working with DOS routines, function intdos(). Renaming file, Deleting file, Create directory, Delete directory using intdos().

1. Herbert shield , "Complete Reference C"
2. Y. Kanetkar, "Pointers through C".
3. Y. Kanetkar, "TSR through C".
4. R.S Salaria, "Application programming in C" Bryan Pfaffenberger, "Linux Command–Instant Reference" – BPB Publications

**Note:** The question paper will have the usual note saying " Attempt Five questions choosing one from each Unit". Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate (numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## BCA- 203 Digital Electronics

### Unit - I

Data types and Number systems, Binary number system, Octal & Hexa-decimal number system, 1's & 2's complement, Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes

### Unit - II

Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra, Basic Boolean Law's, Demorgan's theorem, MAP Simplification, Minimization techniques, K-Map, Sum of Product & Product of Sum

### Unit - III

Combinational & Sequential circuits, Half Adder & Full Adder, Full subtractor, Flip-flops - RS, D, JK & T Flip-flops, Shift Registers, RAM and ROM, Multiplexer, Demultiplexer, Encoder, Decoder, Idea about Arithmetic Circuits, Program Control, Instruction Sequencing

### Unit - IV

I/O Interface, Properties of simple I/O devices and their controller, Isolated versus memory-mapped I/O, Modes of Data transfer, Synchronous & Asynchronous Data transfer, Handshaking, Asynchronous serial transfer, I/O Processor

### Unit - V

Auxiliary memory, Magnetic Drum, Disk & Tape, Semi-conductor memories, Memory Hierarchy, Associative Memory, Virtual Memory, Address space & Memory Space, Address Mapping, Page table, Page Replacement, Cache Memory, Hit Ratio, Mapping Techniques, Writing into Cache.

### Books :

1. BARTEE, "Digital Computer Fundamentals" TMH Publication
2. MALVINO, " Digital Computer Electronics " TMH Publication
3. MORRIS MANO, "Computer System Architecture" PHI Publication

**Note:** The question paper will have the usual note saying " Attempt Five questions choosing one from each Unit". Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## BCA-204 Object Oriented Programming Methodology with C++

### Unit-I

Overview of C++ : Object oriented programming, Concepts, Advantages, Usage, C++ Environment: Program development environment, the language and the C++ language standards. Introduction to various C++ compilers, C++ standard libraries, Prototype of main() function, Data types. Creating and compiling C++ Programs using IDE and through command line, IDE features for compiling, debugging, tracing and testing the C++ program in Turbo C++/Borland C++/MicroSoft VC++/GNU C++ compiler.

Classes & Objects : Classes, Structure & classes, Union & Classes, Friend function, Friend classes, Inline function, Scope resolution operator, Static class members, Static data member, Static member function, Passing objects to function, Returning objects, Object assignment.

### Unit-II

Array, Pointers References & The Dynamic Allocation operators : Array of objects, Pointers to object, Type checking C++ pointers, The This pointer, Pointer to derived types, Pointer to class members, References: Reference parameter, Passing references to objects, Returning reference, Independent reference, C++ 's dynamic allocation operators, Initializing allocated memory, Allocating Array, Allocating objects. Constructor & Destructor : Introduction, Constructor, Parameterized constructor, Multiple constructor in a class, Constructor with default argument, Copy constructor, Default Argument, Destructor.

### Unit-III

Function & operator overloading : Function overloading, Overloading constructor function finding the address of an overloaded function, Operator Overloading: Creating a member operator function, Creating Prefix & Postfix forms of the increment & decrement operation, Overloading the shorthand operation (i.e. +=, -= etc), Operator overloading restrictions, Operator overloading using friend function, Overloading New & Delete, Overloading some special operators, Overloading [ ], ( ), -, comma operator, Overloading <<,

### Unit-IV

Inheritance : Base class Access control, Protected members, Protected base class inheritance, Inheriting multiple base classes, Constructors, destructors & Inheritance, When constructor & destructor function are executed, Passing parameters to base class constructors, Granting access, Virtual base classes . Virtual functions & Polymorphism : Virtual function, Pure Virtual functions, Early Vs. late binding

### Unit-V

The C++ I/O system basics : C++ streams, The basic stream classes: C++ predefined streams, Formatted I/O: Formatting using the ios members, Setting the format flags, Clearing format flags, An overloaded form of setf( ), Examining the formatted flags, Setting all flags, Using width(), precision() and fill(), Using manipulators to format I/O, Creating your own manipulators.

#### Books :

1. Object oriented programming in C++ by Robert Lafore.
2. Object oriented programming with C++ by David Parsons.
3. Object oriented design with C++ by Ken Barclay.
4. Programming with C++ Made simple by K. Kumar , TMH 2002

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## **BCA-205 Data Base Management System**

### **Unit I**

DBMS Concepts and architecture Introduction, Review of file organization techniques, Database approach v/s Traditional file accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, Functions of DBA and designer. Entities and attributes, Entity types, Value, Sets, Key attributes, Relationships, Defining the E-R diagram of database, Various data models : Basic concepts of Hierarchical data model, Network data model, and Relational data model, Comparison between the three types of models.

### **Unit II**

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints, Intension and Extension, Relational Query languages: Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union etc.

### **Unit III**

Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations. SQL: Data definition in SQL, update statements and views in SQL QUEL & QBE: Data storage and definitions, Data retrieval queries and update statements etc.

### **Unit IV**

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies. Distributed databases, protection, security and integrity constraints, concurrent operation on databases, recovery, transaction processing, basic concepts of object oriented data base system and design.

### **Unit V**

Case study of relational database management systems: Oracle and Microsoft access, Oracle tools.

### **Books :**

1. Data Base Management System by C.J. Date
2. Data Base Management System by Ullman
3. Fundamental of database system by Elmasri / Navathe the Benjamin / Cummings Publishing company inc.
4. Data base design by Gio Wiederhold. McGraw Hill
5. Fundamental of Data Base Management System by Leon & Leon, Vikas Publishing House Pvt. Ltd.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## **BCA-206 Principles of Management & Managerial Economics**

### **Unit I**

**Management Concept :** Management, Administration, Organisation Management and Administration. Difference and Relationship between Organizations, importance of Management, characteristics of Management

### **Unit II**

Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management

### **Unit III**

**Decision Making :** Introduction and Definition, Types of Decision, Techniques of Decision Making, Decision making under uncertainty, Decision Making under risk

### **Unit IV**

**Managerial Economics :** Introduction of Managerial Economics, Factors Influencing Manager, Micro - and Macroeconomics, Theory of the Cost, Theory of the Firm, Theory of Production Function, Production System

### **Unit V**

Input-Output Analysis, Micro Economics Applied to plants and industrial Undertakings, Productivity, Factors affecting Productivity, increasing Productivity of Resources

### **Books :**

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| 1. The Practice of Management                      | : Peter Drucker, Harper and Row                                    |
| 2. Essentials of Management                        | : Koontz Prentice Hall of India                                    |
| 3. Management                                      | : Staner Prentice Hall of India                                    |
| 4. Principle & Practice of Management              | : T.N. Chhabra : Dhanpat Rai New Delhi                             |
| 5. Industrial Organisation & Engineering Economics | : T.R. Banga & S.C. Sharma, Khanna Publishers                      |
| 6. Industrial Engineering & Management             | : O.P. Khanna, Dhanpat Rai   |
| 7. Managerial Economics                            | : Joel Dean : Prentice Hall of India                               |
| 8. Managerial Economics Concepts and Cases         | : V.L. Mote, Samuel Paul, G.S Gupta, Tata Mc. Graw Hill New Delhi. |

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## BCA- III Semester

### BCA-301 Data Structures

#### Unit-I

The concept of data structure, Abstract data type, Concept of list & array Introduction to stack, Stack as an abstract data type, primitive operation on stack, Stacks application: Infix, post fix, Prefix and Recursion, Multiple Stack. Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular queue, Dequeue, Priority queue, Applications of queue

#### Unit -II

Introduction to the Linked List , Basic operations on linked list, Stacks and queues linked list, Header nodes, Doubly Linked List, Circular Linked List, Stacks & Queues as a Circular Linked List, Application of Linked List.

#### Unit -III

TREES - Basic Terminology, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary tree, Traversal of binary trees:- In order, Preorder & post order, Application of Binary tree, Threaded binary tree, B-tree & Height balanced tree, Binary tree representation of trees.

#### Unit -IV

Analysis of algorithm, complexity using big 'O' notation. Searching: linear search, Binary search, their comparision. Sorting :Insertion sort, Selection sort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.Hash Table, Collision resolution Techniques.

#### Unit -V

Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Graph Traversal-Depth first & Breadth first search. Spanning Trees, minimum spanning Tree, Shortest path algorithm

Books :

1. Fundamentals Of Data Structure, By S. Sawhney & E. Horowitz
2. Data Structure : By Trembley & Sorrenson
3. Data Structure : By lipschuits (Schaum's Outline Series Mcgraw Hill Publication)
4. Fundamentals Of Computer Algorithm: By Ellis Horowitz and Sartaj Sawhney

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-302 Internet and E-Commerce**

### **Unit-I**

Internet: Evolution, Concepts, Internet Vs Intranet, Growth of Internet, ISP, ISP in India, Types of connectivity - Dial-up, Leased line, DSL, Broadband, RF, VSAT etc., Methods of sharing of Internet connection, Use of Proxy server. Internet Services – USENET, Gopher, WAIS, ARCHIE and VERONICA, IRC. WORLD WIDE WEB (WWW) - History, Working, Web Browsers, Its functions, URLs, web sites, Domain names, Portals. Concept of Search Engines, Search engines types, searching the Web, Web Servers, TCP/IP and others main protocols used on the Web. E-Mail: Concepts, POP and WEB Based E-mail, merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free E-mail services, e-mail servers and e-mail clients programs.

### **Unit-II**

Concepts of Hypertext, HTML introduction, features, uses & versions Using various HTML tags, Elements of HTML syntax, Head & Body Sections, , Inserting texts, Text alignment, Using images in pages, Hyperlinks – text and images, bookmarks, Backgrounds and Color controls, creating and using Tables in HTML, and presentation. Use of font size & Attributes, List types and its tags. Cascading Style sheets - defining and using simple CSS.

### **Unit-III**

Introduction to WYSIWYG Design tools for HTML, Overview of MS FrontPage, Macromedia Dream weaver, and other popular HTML editors, designing web sites using MS FrontPage (using at least FrontPage 2000). Use of Frames and Forms in web pages, Image editors, Issues in Web site creations & Maintenance, Web Hosting and publishing Concepts, Hosting considerations, Choosing Web servers – Linux Vs Windows Web servers, Choosing Domain names, Domain name Registration, Obtaining space on Server for Web site, FTP software for upload web site. Add your website on search engines

### **Unit-IV**

Javascript Overview, Javascript and the WWW, Javascript vs. VB Script VBScript, Javascript vs. Java, Javascript versions, Script element,. Functions: Functions introduction, Calling functions, Javascript Comments, Variables: Variables overview, declaring variables, Types of variables, Casting variables, Alert box , Prompt & confirm. Expressions: Arithmetic operators, Assignment operators, Logical operators, Expressions and precedence, Statements: If statement, For statement, While statement, Break/Continue Creating arrays/event handlers, JavaScript Object model, Object and Events in JavaScript – OnClick, On MouseOver, On Focus, OnChange, OnLoad etc. Getting data with forms.

### **Unit-V**

E - Commerce An introductions, Concepts, Advantages and disadvantages, Technology in E-Commerce, Internet & E-business, Applications, Feasibility & various constraints. E-transition challenges for Indian corporate, the Information Technology Act 2000 and its highlights related to e-commerce.

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Vikram University, Ujjain – BCA Syllabus (w.e.f.- 2010-11 & onwards)

Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit Card-Based Electronic Payment Systems, Risk and Electronic Payment Systems.

E-security – Security on the internet, network and web site risks for e-business, use of firewalls, secure physical infrastructure.

**Books :**

1. Frontiers of Electronic Commerce, By- Kalakota, Ravi ; Stone, Tom ; Whinston, Andrew B, Addison Wesley Publishing Co
2. E-Commerce An Indian Perspective (Second Edition) – by P.T. Joseph, S.J. Prentice-Hall of India
3. Learn HTML in a weekend by Steven E. Callihan, PHI
4. Using HTML By Lee Anne Phillips, PHI
5. SAMS Teach Yourself Javascript in 24 Hrs. By Michael Moncur, TechMedia

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-303 Information System Design and Implementation**

### **Unit -I**

Meaning, Nature, Need, Role, Importance, Evolution of Management Through Information system. Structure of Management Information System.

### **Unit -II**

Relatedness of MIS with management activities, Management functions and decision making. Information System in Business and Management.

### **Unit -III**

Development of MIS- Methodology and Tools/ Techniques for systematic designing, implementation, evaluation, modification of MIS.

### **Unit -IV**

A study of major financial, production, manpower and marketing MIS and case studies.

### **Unit -V**

Advanced MIS-concept, need and problems in achieving advanced MIS, Decision support System. Rationale of computer application, Decision support system (DSS)

#### **Books :**

1. Murdick,R.G.,Ross,J.E.& Claggett,J.R. : Information systems for Modern Management,PHI
2. Thomas,R. & Prince : Information systems for planning and control.
3. Wigarders, K.,Syensson, A., Sehong, L.,Rydin, A. & Dahlberg, G. : Structured Analysis & Design of Information system, McGraw Hill Book company,1986.
4. Aktas : structured analysis and design of information system, PHI
5. Spargue and Watson : Decision Support System ,2nd Edn. Prentice Hall international,1989.
6. David : Applied Decision Support, Prentice hall international,1988.
7. Kanter,J. : Management information system,3rd Edn. Prentice Hall India,1984.
8. Bennett,J.L.: Building Decision support System ,Addision- Wesley publ. comp. 1983.
9. Lucas : Analysis,Designand implementation of Information system, 3rd Edn. McGraw Hill Book comp.
10. Senn. : Analysis and Design of Information System, McGraw Hill Book comp.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-304 Data Communication and Computer Networks**

### **Unit I**

Introduction Theoretical Model for Communication, analog and digital signal, Bandwidth, Noise, Channel Capacity, Data-rate, Concepts of Circuit Switching, Message switching and Packet switching with their timing diagrams, comparison of switching techniques, ISDN.

### **Unit II**

Evolution of Computer Networks - Layered Network architecture, OSI Layers Model, transmission media - topology, error detection & Correction techniques, Parity checks, CRC, Asynchronous and synchronous transmission, TDM, FDM.

### **Unit III**

Data-Link layer: Different Types of line discipline, simplex, Half duplex and full duplex, Flow control; stop and wait protocol, sliding Window Protocol With their efficiency, ARQ techniques & their performance, HDLC.

### **Unit IV**

LAN: Static & Dynamic channel allocation, Media access control for LAN & WAN; ALOHA : pure, slotted ALOHA, CSMA, CSMA/CD IEEE 802 standards for LAN & MAN: 802.3, 802.4, 802.5, 802.6 and 802.2 & their comparison Fast LANs: fast Ethernet, FDDI

### **Unit V**

Routing: Definition, Elements of routing techniques, Least Cost Routing algorithm Dijkstra's algorithm, Bellman-ford algorithm, Routing Strategies, Congestion Control encryption & description techniques, Internet working, Internet and Intranet

#### **Books**

1. Computer Networks - Tanenbaum A. S. PHI.
2. LANs - Keizer
3. Computer Networks - Stalling W., PHI.

**Note:** The question paper will have the usual note saying "Attempt Five questions choosing one from each Unit". Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## **BCA-305 Computer Graphics & Multimedia**

### **Unit I**

Introduction to Raster scan displays, Storage tube displays, refreshing, flickring, interlacing, colour monitors, display processors resolution, working principle of dot matrix, inkjet laser printers, working principles of keyboard, mouse scanner, digitizing camera, track ball, tablets and joysticks, graphical input techniques, positioning techniques, rubber band techniques, dragging etc.

### **Unit II**

Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham's Algorithm, Circle drawing, general method, symmetric DDA, Bresenham's Algorithm, curves, parametric function, Bezier Method, B-spline Method.

### **Unit III**

2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse transformation, Composite transformation, world coordinate system, screen coordinate system, parallel and perspective projection, Representation of 3D object on 2D screen.

### **Unit IV**

Point Clipping, Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gouraud shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.

### **Unit V**

Multimedia components, Multimedia Hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia Tools, Presentation tools, Authoring tools, presentation.

#### **Books :**

1. James E. Shuman, "Multimedia in Action" Thomson / Vikas Publishing House.
2. Tay Vaughan "Multimedia: making it work" Tata McGraw Hill 1999, 4<sup>th</sup> Edition
3. Prabhat k Andleigh, Kiran Thakral "Multimedia System Design", PHI
4. Donald Hearn and M.P. Becker "Computer Graphics" PIR Pub.
5. Foley Vandam, Feiner, Hughes "Computer Graphics Principle & Practice" Addison Wesley, 2/e. 1997
6. Principles of Computer Graphics "Rogers" TMH.

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## **BCA-306 Communication Skills -II**

### **Unit I**

Languages and skills of Communication: Linguistic Techniques, Modern usage and style-comprehension skills, English Phonetic symbols/signs, Oral Presentation - Audition.

### **Unit II**

Application of linguistic ability Writing of definitions of engineering terms, Objects, processes and principles (Listening) Topics of General Interest, Reproduction from business, daily life, travel, health buying & selling, company structure, systems etc.

### **Unit III**

Letter Writing: Applications, Enquiry, Calling quotations, Tenders, Order and complaint.

### **Unit IV**

Precise Writing, Noting and drafting, Technical Descriptions of simple engineering objects and processes (Writing), Report writing, Precis writing, note writing, slogan writing comment, speech advertising.

### **Unit V**

Writing technical reports of the type of observation report, Survey report, Report of trouble, Laboratory Report and Project Report on the subjects of engineering. (Speaking) Vocabulary, Presentations, Demonstrations, Conversation - Telephone media, socialising, cultural events, debates, speech.

#### **Books: -**

1. Business Correspondence and Report Writing - By Krishna Mohan, Prentice Hall India.
2. Living English Structure - By W. Stannard Allen, Longmans.
3. Student's Grammar - By Dev Willys Collins (Harper).
4. Spoken English for India - By R.K. Bansal & IB Harrison (Orient Longman).
5. New International Business English - By Joans and Alexander (OUP).
6. Testing English as a Second Language - By David P. Harris (McGraw Hill Pub.)

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## BCA- IV Semester

### BCA-401 Programming with Visual Basic

#### Unit-I

Basic of Visual Basic : The Integrated Development Environment : The Menu Bar, The Toolbars, The Project Explorer, The Toolbox , The Properties Window, Your First/VB Project : Remaining and Saving the Project. The Elements of the User Interface . Programming an Application : Programming the command Buttons, Grouping Controls. Visual Development and Events-Driven Programming : A Few common Properties , A Few Common Methods, A Few Common Events .

#### Unit- II

Customizing the Environment : The Editor Tab, The Editor Format Tab, The General Tab, The Docking Tab, The Environment Tab, The Advanced Tab. Visual Basic Projects : Building a Loan Calculator : Deciding How the Loan Application Works, Design the User Interface, Programming the Loan Application, Validating the Data. Building a Math Calculator : Designing the User Interface, Programming the Math Application, Adding More Features, Error Trapping. A Project's Files : The Project File, The Form File, Moving and Copying Projects, Executable files.

#### Unit- III

Visual Basic : The Language. Variables : Declaring Variables, converting Variable Types, User-Defined Data Types, Special Values, Examining Variable Types, Forcing Variable Declarations, A Variable Declarations, A Variable's Scope The Lifetime of a Variable. Constants . Arrys : Declaring Arrays, Specifying Limits, Multidimensional Arrays, Dynamic Arrays, Arrays of Arrays.

#### Unit- IV

Procedures : Subroutines, Functions , Calling Procedures Arguments : Argument-Passing Mechanisms, Using Optional Arguments, Passing an Unknown Number of Arguments, Named Arguments. Function Return Values : Functions Returning Custom Data Types, Functions Return Values Control flow Statements : If ... Then, If ... Then ... Else , Select Case, Loop Statements : Do Loop, For Next, While Wend, Nested Control Structures, The Exit Statement.

#### Unit- V

Working with Forms : An Application with Multiple Forms : The Startup Object The Appearance of Forms : The Start-Up Form, Loading, Showing, and Hiding Forms, Controlling One Form from within Another. Designing Menus : The Menu Editor, Programming Menu Commands, Building Dynamic forms at Runtime Drag-and-Drop Operations : The DragMode Property , TheDrag-Drop and DragOver Methods.

#### Book :

1. Mastering in Visual Basic 6

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## **BCA-402 Systems Analysis and Design**

### **Unit-I**

**System Concept:** Definition, Characteristics, Elements of system, Physical and abstract system, open and closed system, man-made information systems. **System Development Life Cycle:** Various phases of system development, Considerations for system planning and control for system success. **System Planning:** Base for planning a system, Dimensions of Planning.

### **Unit -II**

**Initial Investigation:** Determining users requirements and analysis, fact finding process and techniques. **Feasibility study:** Determination of feasibility study, Technical, Operational & Economic Feasibilities, System performance constraints, and identification of system objectives, feasibility report. **Cost/Benefit Analysis:** Data analysis, cost and benefit analysis of a new system. Categories determination and system proposal.

### **Unit -III**

**Tools of structured Analysis:** Logical and Physical models, context, diagram, data dictionary, data diagram, form driven methodology, IPO and HIPO charts, Gantt charts, system model, pseudo codes, Flow charts- system flow chart, run flow charts etc., decision tree, decision tables, data validation, Input/ Output and Form Design: Input and output form design methodologies, menu, screen design, layout consideration.

### **Unit -IV**

**Management standards** – Systems analysis standards, Programming standards, Operating standards. **Documentation standards** – User Manual, system development manual, programming manual, programming specifications, operator manual. **System testing & quality:** System testing and quality assurance, steps in system implementation and software maintenance. **System security:** Data Security, Disaster/ recovery and ethics in system development, threat and risk analysis. **System audit.**

### **Unit-V**

**Organisation of EDP:** Introduction. Job Responsibilities & duties of EDP Personnel- EDP manager, System Analyst, Programmers, Operators etc. Essential features in EDP Organization. **Selection of Data Processing Resources:** purchase, lease, rent-advantages and disadvantages. **Hardware and software procurement** – In-house purchase v/s hiring and lease.

### **Books:**

1. System Analysis & Design by V K Jain, Dreamtech Press
2. Modern System Analysis &Design by A Hoffer, F George, S ValaciahLow Priced Edn. Pearson Education.
3. Information Technology & Computer Applications, by V.K.Kapoor, Sultan Chand & Sons, New Delhi.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## **BCA-403 Artificial Intelligence & Expert Systems**

### **Unit- I**

Basic Problem solving methods: Production systems-state space search, control strategies, Heuristic search, forward and backward reasoning, Hill climbing techniques, Breadth first search, Depth first search, Best search, staged search.

### **Unit -II**

Knowledge Representation: Predicate logic, Resolution question Answering, Nonmonotonic Reasoning, statistical and probabilistic reasoning, Semantic Nets, Conceptual Dependency, frames and scripts.

### **Unit -III**

AI languages: Important characteristics of AI languages - PROLOG, LISP.

### **Unit -IV**

Introduction to Expert Systems: Structure of an Expert system interaction with an expert, Design of an Expert system.

### **Unit V**

Neural Network: Basic Structure of a neuron, Perception Feed forward, Back propagation, Hopfield Network.

Books:

1. Rich E and Knight K - Artificial Intelligence, TMH New Delhi.
2. Nelsson N.J. - Principles of Artificial Intelligence, Springer Verlag, Berlin.
3. Barr A, Fergenbaub E.A. and Cohen PR. Artificial Intelligence, Addisonwesley, Reading (Mars) 1989.
4. Waterman D.A. A guide to Expertsystem, Adision - Wesley, Reading (Mars) 1986.
5. Artificial Intelligence Hand book, Vol. 1-2, ISA, Research Triangle Park 1989.
6. Kos Ko B Neural Networks and Fuzzy system -pH.
7. Neural Network Design, Martin Hagar, Vikas-Thomson Learning, Vikas Pub. House Pvt. Ltd., Delhi.
8. Expert Systems : Principals & Programming, Joseph Giarrantons & Rilay, Vikas – Thomson Learning, Vikas Pub. House Pvt. Ltd., Delhi.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## BCA- 404 RDBMS Using ORACLE

### Unit-I

Oracle product details, Different Data base model , RDBMS components – Kernel, Data dictionary, Client/Server Computing and Oracle, Overview of oracle architecture – Oracle files, System and User process, Oracle Memory, System data base object, Protecting data

### Unit-II

Oracle data types, Working with Tables.Data Constraints, Column level & table Level Constraints.

Defining different constraints on the table Defining Integrity Constraints in the ALTER TABLE Command. Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL

Joining Multiple Tables (Equi Joins),Joining a Table to itself (self Joins),Subqueries Union, intersect & Minus Clause,Creating view,Renaming the Column of a view,Granting Permissions, - Updation, Selection, Destroying view

### Unit-III

Creating Indexes.Creating and managing User, PL/SQL, SQL & PL/SQL differences, block structure, variables, constants, datatype, Assigning database values to variables, Select ... INTO, Using cursors

### Unit-IV

Error handling, Built-in exceptions, User defined exceptions, The Raise-Application-error procedure, Oracle transaction, Locks, Implicit and Explicit locking. Procedures & Functions - Concept, creation, execution, advantages, syntax, deletion.

### Unit-V

Triggers - Concept, use, how to apply database triggers, type of triggers, syntax, deleting. Functions of Oracle DBA.Create Database, Create tablespace. Import & Export Oracle backup & recovery

### Books :

1. Ivan Bayross, "SQL, PL/SQL", Bpb Publications"
2. Liebschutzy, "The Oracle Cook Book", BPB Publication
3. Michael Abbey, Michael J.Corey, "Oracle A Beginners Guide". TMH Publication
4. Oracle Unleashed (Chapter 1,2,3,4,5 and 9)

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## BCA-405 Enterprise Resource Planning

### Unit-I

**Overview of business Functions :** Business function in an Organisation, material management, scheduling, shop floor control, forecasting, accounting and finance, human resources, Productivity management. Typical business Processes :Core Processes, Product control, sales order Processing, purchases, administrative Process, human resource, finance, Support processes, marketing, strategic Planning, research & development.

### Unit-II

**Problems in traditional functional view :** Need for integrated process views information as a resource, motivation for ERP.

### Unit-III

#### Evolution of information systems

Electronic Data Processing (EDP) systems, management information systems, Executive information Systems, Information needs Of Organisation, ERP as an integrator of information needs at various levels, Decision making involved at the above level.

### Unit-IV

#### ERP Models/Functionality

Sales order Processing. MRP scheduling, forecasting, maintenance, distribution, finance. Features of each of the models, description of data flows across each module, overview of the supporting databases, technologies required for ERP.

### Unit-V

**Implementation Issues :** Pre implementation issues, financial justification of ERP, evaluation Of commercial software, during implementation issues, reengineering of various business processes, education and training, project management, Post implementation issues, performance measurement.

#### Books :

1. V-K. Garg and N.K. Venkitakrishnan, Enterprise Resource Planning Practices Prentice Hall
2. J.Kanter, Managing with information, Prentice Hall(I) 1996, New Delhi.
3. S-Sadagopan, Management Information Systems, Prentice Hall(I) 1996 New Delhi.
4. V. Rajaraman, Analysis and Design Of Information Systems, Prentice Hall(I)1997, New Delhi
5. K.M. Hussain and D. Hussain, Information Systems : Analysis Design and Implementation, Tata McGraw Hill 1995 New Delhi.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-406 Organizational Behavior**

### **Unit-I**

Introduction to organisations and individuals. What is an organisation, components of organisation nature and variety of organisation (in terms of objectives, structure etc.) models of analysing organisation phenomena.

### **Unit-II**

Organisational and business variables. organisation in the Indian context, institutions and structures, basic roles in an organisation etc., perception attitudes, motives (achievement, poser and affiliation).

### **Unit-III**

Commitment : Value creativity and other personality factors. Profile of a manager and an entrepreneur.

### **Unit-IV**

Interpersonal and group processes - Interpersonal trust, understanding the other person from his/her point of view, interpersonal communication, listening, feedback counseling, transactional analysis, self functioning, team decision making team conflict resolution, team problem solving.

### **Unit-V**

Organisational structure and integrating interpersonal and group dynamics elements of structure. Function of structure, determinants of structure, dysfunctionalities of structure, structure technology, environment people relationship, principles underlaying design of organisation, organisational change, integrating cases.

#### **Books :**

1. A.J.Robertson Lvan T.& cooper, Cary.L. "Work psychology Understanding Human Behaviour in the Workplace" Macmillan India Ltd. Delhi 1996.
2. Dwivedi R.S. "Human Relations and Organisational Behaviour A Global Perspective" Macmillan India Ltd. Delhi 1995.
3. Arnold J.Robertson Laven T. and Coopercary. L. "Work Psychology: Understanding Human Behaviour in the Workplace" Macmillan India Ltd. Delhi 1996.
4. French & Bell (4th ed) "Organisation Development: Behavioural Science Interventions for organisation Improvement: Prentice Hall of India Pvt. Ltd., New Delhi 1996.
5. P.Kesho "Organisational Development for Excellence" MacMillan India 1996. Robbins(th ed), Essentials of organisational Behaviour, Prentice Hall of India.

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## BCA- V Semester

### BCA-501 Software Engineering

#### Unit -I

The Software Product and Software Process: Software Engineering - A layered Technology, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model Evolutionary Software Process Models: Incremental Model, Spiral Model Coniponent Assembly Model, Formal Methods, Fourth-Generation Techniques

#### Unit -II

Systems Engineering: The Systems Engineering Hierarchy, Information Engineering. Information Strategy Planning, Business Area Analysis, Product Engineering. Requirement Analysis Modeling: Analysis Concepts and Principles, The Elements of the Analysis Model Data Modifying, Functional Modeling and Information Flow and Behavior Modeling, Mechanics of Structured Analysis, Data Dictionary

#### Unit -III

Design Concepts, Principles, and Methods: The Software Design Process: Design PrinciplesDesign Concepts: Effective Modular Design, Design Heuristics, Design Documentation, Design Methods: Data Design, Architectural Design, Interface Design, Human Computer Interface Design, Procedural Design.

#### Unit -IV

Software Testing Methods: Software Testing Fundamentals, Test Case Design, Black-Box Testing, White-Box Testing. Software Testing Strategies: Verification and Validation, Strategic Issues, Unit Testing, Integration Testing, Validation Testing, System Testing.

#### Unit V

Software Process and Project Metrics:Measures, Metrics and Indicators, Metrics in the Process and Project Domains, Software Measurement, Metrics of Software Quality

#### Books:

1. Software Engineering: A Practitioner's Approach by P.S. Pressman Fourth edition 1997, McGraw-Hw pub.
2. An Integrated Approach to Software Engineering – Pankaj Jalote, 1991, Narosa Pub.
3. Software Engineering University Press – by I. Sonunerville Oxford university press 1996
4. Fundamentals of Software Engineering Leon and Leon – Vikas Publishing House Pvt. Ltd.

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## **BCA-502 Programming With JAVA**

### **Unit-I**

C++ Vs JAVA, JAVA and Internet and WWW, JAVA support systems, JAVA environment. JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant & Variables, Data Types, Declaration of Variables, Scope of Variables, Symbolic Constants, Type Casting. Operators : Arithmetic, Relational, Logical Assignments, Increment and Decrement. Conditional, Bitwise, Special, Expressions & its evaluation. If statement, if...else... statement, Nesting of if...else... statements, else...if Ladder, Switch, ? operators, Loops – While, Do, For, Jumps in Loops, Labelled Loops.

### **Unit-II**

Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods. Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control.

### **Unit-III**

Arrays: One Dimensional & two Dimensional, strings, Vectors, wrapper Classes, Defining Interface Extending Interface, Implementing Interface, Accessing Interface Variable, System Packages, Using System Package, Adding a Class to a Package, Hiding Classes.

### **Unit-IV**

Creating Threads, Extending the Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the Runnable Interface.

### **Unit-V**

Local and Remote Applets Vs Applications, Writing Applets, Applets Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing Parameters to Applets, Aligning the Display, HTML Tags & Applets, Getting Input from the User.

### **Books :**

1. Balaguruswamy, "Programming In Java", 2nd Edition, TMH Publications
2. "Peter Norton, Guide To Java Programming, Techmedia Publications

**Note:** The question paper will have the usual note saying "Attempt Five questions choosing one from each Unit". Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate (numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-503 Microprocessor and Interfacing**

### **Unit I**

Microprocessor : Detailed architecture of 8085, Register architecture, buses, flags, interrupts, salient features of advanced microprocessors: 8086/ 8088/ 286/386/486/ Pentium. Super scalar architecture of Pentium.

### **Unit II**

Introduction to assembly language programming of 8085 and 8086, addressing modes, subroutine call and returns.

### **Unit III**

Introduction to various interfacing chips like 8212, 8155, 8255, 8755. General purpose programmable peripheral devices (8253) 8254 programmable interval timer, 8259 A.

### **Unit IV**

Programmable interrupt controller & DMA, 8257 DMA Controller. Serial I/O & data communication : USART, RS232C, modem etc. and various bus standards.

### **Unit V**

Introduction to micro-controllers, DSP processors and transporters, development tool like MDS and logic analyzer, memory interfacing, floppy and CD ROM drives, introduction to programmable key boards, display interface, interfacing printers, LED's, ADC, DAC and stepper motor.

#### **Books:**

1. B.B. Brey (PHI), "The Intel Microprocessors, Architecture, Programming & Interfacing".
2. A. Triebel & Avtar Singh (PHI), "The 8088/8086 Microprocessor".
3. D. Hall (Mc Graw Hill), "Advance Microprocessor & Interfacing".
4. R.L. Krutz (John Wiley), "Interfacing techniques in digital design with emphasis on microprocessor"
5. A.P. Mathur (TMA), " Introduction to microprocessor".

**Note:** The question paper will have the usual note saying " Attempt Five questions choosing one from each Unit". Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

## **BCA-504 Internet Technology with ASP.NET and C#**

### **Unit-I**

Overview of ASP.NET framework, Understanding ASP.NET Controls, Applications, Web servers, installation of IIS. Web forms, web form controls -server controls, client controls, web forms & HTML, Adding controls to a web form ,Buttons, Text Box , Labels, Checkbox, Radio Buttons, List Box, etc. Running a web Application, creating a multiform web project.

### **Unit-II**

Form Validation: Client side validation, server Side validation, Validation Controls : Required Field Comparison Range. Calendar control, Ad rotator Control, Internet Explorer Control. State management- View state, Session state, Application state,

### **Unit-III**

Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, DataAdapter Class, Dataset Class. Display data on data bound Controls and Data Grid. Database Accessing on web applications: Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound controls.

### **Unit-IV**

Writing datasets to XML, Reading datasets with XML. Web services: Introduction, Remote method call using XML, SOAP, web service description language, building & consuming a web service, Web Application deployment.

### **Unit-V**

Overview of C#, C# and .NET, similarities & differences from JAVA, Structure of C# program Language features: Type system, boxing and unboxing, flow controls, classes, interfaces, Serialization, Delegates, Reflection.

Books :

1. VB.NET Black Book by steven holzner –dreamtech
2. ASP.NET Unleashed
3. C# programming – wrox publication
4. C# programming Black Book by Matt telles

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## **BCA-505 Software Testing and Project Management**

### **Unit- I**

Testing basics and Development Models: Principles and context of testing in software production, Usability and Accessibility Testing, Phases of Software Project, Process models to represents different phases, Software Quality Control and its relation with testing, validating and verification, Software Development life cycle models, various development models. White Box Testing: White Box Testing - Static Testing, Structural Testing-Unit code functional testing, Code coverage testing, code complexity testing, Black Box Testing- What? Why and when to do Black box testing, Requirements based testing, Positive and Negative Testing, Boundary value testing, Decision Tables, Equivalence Partitioning, State Based or Graph Based Testing, Compatibility Testing, User Documentation Testing, Domain Testing.

### **Unit- II**

Integration Testing: Introduction and types of integration testing, Scenario testing, defect bash. System and Acceptance Testing- Overview, functional and non-functional testing, Acceptance testing. Overview of some software testing tools: WinRunner, LoadRunner, Test Director.

### **Unit- III**

Performance Testing- Introduction, factors related to performance testing, methodology for performing testing, Regression Testing, Ad hoc Testing- Overview, Buddy & pair testing, Exploratory testing, Interactive testing, Agile and extreme testing. Testing of Object Oriented Testing – Introduction, Differences in OO testing.

### **Unit- IV**

Software Project Management: Overview, Software Project Management Framework, Software Development life cycle, Organization Issues and Project Management, Managing Processes, Project Execution, Problems in Software Projects, Project Management Myths and its clarifications. Software Project Scope: Need to scope a software project, scope management process, communication techniques and tools, communication methodology Software Requirement Gathering and Resource allocation: Requirement specifications, SRS Document preparation, Resources types for a software projects, requirement for resources allocation.

### **Unit- V**

Software Project Estimation: Work Breakdown structure (WBS), steps in WBS, Measuring efforts for a project, techniques for estimation – SLOC, FP, COCOMO and Delphi methods. Project Scheduling: Scheduling and its need, scheduling basics, Gantt Chart, Network scheduling techniques, Pert and CPM Using a Project Management Tool: Introduction to MS Project 2000, Managing tasks in MS Project 2000, Tracing a project plan, creating and displaying project information reports.

Books :

1. Software Testing: Principles and Practice By Gopalaswamy and Srinivasan,, Pearson Education India.
2. Software Testing Tools: Covering WinRunner, Silk Test, LoadRunner, JMeter and TestDirector with case  
By Dr. K.V.K.K. Prasad, ISBN: 8177225324, Wiley Dreamtech,
3. Basics of Software Project Management, Prentice Hall of India, ISBN 81-203-2490-0
4. Software Project Management by Bob Hughes & mike Cotterell, Tata McGrawHill

**Note:** The question paper will have the usual note saying “ Attempt Five questions choosing one from each Unit”. Thus, The paper will clearly specify Units and have a pattern of two questions per unit with an option to attempt any one of these two within each unit. The balance of the paper will be maintained by including appropriate ( numerical/ conceptual/analytical/ theoretical) combination of subsections of each question.

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## BCA VI SEMESTER

### DETAILED SCHEDULE AND SCHEME OF EXAMINATION OF

### BCA FINAL SEMESTER PROJECT WORK

(w.e.f. 2013-2014 & Onwards and also effective for 2011-12 & 2012-13 batches)

1. Students of BCA final semester are required to undergo 4-5 months Major Project work **in the institute/college itself**. Principal/Director of the College/institute shall assign the project guide to each enrolled student of BCA Final Semester. The guide in turn, shall allot project title considering the interest and skill of the student. **Every student is required to carry out project individually on different topics and project in group will not be considered** for evaluation in any case.
2. **The Major Project Work will be carried out in the Institute/college itself, where students are enrolled.** It will be the responsibility of the Principal/Director to assign Guide and Laboratory schedule in the beginning of the semester itself, for all the students. **Students will attend college/institute regularly** to complete their project work within the period of 4-5 months.
3. Following should be the detailed schedule for the Major Project Work, which will start since January:

I. Last date of allotment of guide, title and lab. schedule	<b>10<sup>th</sup> February</b>
II. Last date of receipt of the synopsis of the project	<b>28<sup>th</sup> February</b>
III. Last date of receipt of First progress report of the project	<b>30<sup>th</sup> March</b>
IV. Last date of receipt of Second progress report of the project	<b>30<sup>th</sup> April</b>
V. Date of <b>Submission of complete project report /dissertation</b> in prescribed format in <b>4 Hard Bound Copies</b> (including one student's copy) ( Kindly see para <b>5. FORMAT OF PROJECT REPORT DISSERTATION</b> - for the format of Cover- page and Certificates of the project report/dissertation)	<b>30<sup>th</sup> May</b>
VI. Last date of submission of <b>examination form</b>	<b>30<sup>th</sup> May</b>
VII. <b>DATES OF INTERNAL Project Demo /Seminar</b>	<b>During 1<sup>st</sup> to 5<sup>th</sup> June</b>
VIII. <b>EXTERNAL PROJECT EXAM.</b> (Valuation of Dissertation/ Viva Voce)	<b>During 6<sup>th</sup> to 20<sup>th</sup> June</b>

**4. EXAMINATION :**

**a. Internal Assessment**

Only those students will be allowed to appear in external examinations who get satisfactory remark and certificate of approval of their dissertation from the guide. Satisfactory remark will be given to the students on the basis of attendance during the project work, sincerity, regularity, novelty, originality, standard, performance and timely submission of progress reports & dissertation, satisfactory project demonstration and seminar. There will be a seminar and project demonstration of 30 Minutes (maximum) on the project work (Roll no. wise) for a student. The satisfactory remark will be given to those students who will demonstrate and present their work at satisfaction level of the guide and concerned teachers. The following factors should also be taken into considerations at the time of Internal assessment and seminar:

- (i) Suitable Title and nature of work
- (ii) Its importance /relevance
- (iii) Role of the students in the project
- (iv) Basic understanding about the project
- (v) Ability to explain the work carried out in the given time limit. The presentation should be as per the following guidelines : ( Student may change the sequence for his/her convenience )
  - Preface
  - Earlier system (if any)
  - Drawback of the earlier system (if any)
  - Concept
  - System Highlights
  - System's strong points (if any)
  - Application area
  - Its use and importance to the company and society (if any)
  - Students Role
  - Any other important things about the system
  - Limitations (if any )

The presentation will be evaluated on considering the following factors :

- Presentation Style
- Communication Skill
- Technical contents
- Relevance
- Ability to handle questions and answers with the participants

**b. External Examination:**

- (i) After the completion of all the formalities (including internal assessment) of the project work (as per the schedule) and the certificates in the dissertation must be compulsorily signed by the competent authorities/concerned persons, the Principal/Director of the College/Institute will notify the dates of external examination after the consultations of the examiners who are appointed by the University. The Principal/Director will have to notify the students to bring 4 hard bound copies of the project report /dissertation, a CD containing dissertation/project report/power-point presentation (ppt) and project itself (software developed by the student) for live demonstration.
- (ii) The Project report must be submitted in prescribed format and compulsorily comprise of all the 4 certificates (as decided by the board of studies) and properly signed by the concerned persons. The project report/dissertation which will not be in format or not containing prescribed certificates will not be considered for evaluation in any case.
- (iii) After satisfactory internal assessment as prescribed in para 4a, there will be an external examination conducted by the external examiners appointed by the University during the scheduled dates (during 6<sup>th</sup> to 20<sup>th</sup> June). External examination may comprise the Viva or Seminar, written exam. along-with live demonstration of the project work.
- (iv) The Principal/Director of the College/Institute will make proper arrangement of the Computers, Software, LCD Projector etc. for the external examination.
- (v) The examiners will have to be necessarily from the field of Computer Science only. It will be the responsibility of the Principal/Director to ensure the eligibility of examiners as per the concerned statute no. 29 of the University.

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**5. FORMAT OF COVER PAGE & CERTIFICATES OF PROJECT REPORT/ DISSERTATION**

**i. Format of Cover Page:**

**A**

**DISSERTATION**

**ON**

*< Name of Project Title/ topic name >*

**UNDERTAKEN AT**

*< Name of College/Institute>*

**By**

*<Name of Student >*

**SUBMITTED TO**

**Vikram University, Ujjain**

**In**

**Partial Fulfillment of the Requirements for the Award of the Degree of  
Bachelor of Computer Application ( B. C. A.)**

*<submission month & year>*

**GUIDED By**

*<Name of Guide>*

*<Name of the Department >*

*<Name of the College/institute>*

**ii. Format of the First Certificate (Certificate of the Principal/Director)**

**Certificate of the Principal/Director**

Reference No. ....

Date: .....

## **Project Completion Certificate**

This is to certify that Mr. / Ms. ...<name of the student>.... , student of BCA (final semester) of ... < college /institute name >... , has successfully completed the project work entitled " ... <"Title of the Project">... under the guidance of < name of the guide> is a bonafide piece of work carried out at < name of the college/institute>.

The project entitled <"Title of the Project"> developed by Mr./Ms. ...<name of the student>.... in the college/Institute and he/she has put at least 200 hours of laboratory work during the tenure of the project with the guide to complete this project. All the prescribed certificates are attached after the completion of all the formalities of the project work as per schedule, including internal examination.

Place:

*Signature of Principal /Director*

Date:

*Seal of the Institute*

**iii. Format of the Second Certificate (Certificate of Attendance, duly signed by concerned guide and Principal/Director)**

Reference No. ....

Date : .....

## **Certificate of Attendance**

**This is to certify that Mr. / Ms. ...<name of the student>...., student of BCA (final semester) of ... < college /institute name >... , has put at least 200 hours of laboratory work with the guide to complete this project during the stipulated period of the project at ... < college /institute name >....**

*Signature of Guide*

*Place:*

*Signature of Principal /Director*

*Date:*

*Seal of the Institute*



**iv. Format of the Third Certificate ( DECLARATION i.e. Certificate of originality of work duly signed by guide and student)**

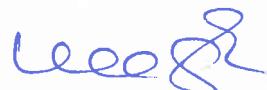
**DECLARATION**

I, < name of the student> of < name of the college/institute> declare that the dissertation/project report submitted by me under the guidance of < name of the guide> is a bonafide work for the partial fulfillment of the requirement of the BCA final semester project work. I have incorporated all the suggestions provided by my guide time to time.

I further declare that to the best of my knowledge this dissertation contains my original work and does not contain any part of any work which has been submitted for the award of any degree either in this university or in any other university/Deemed university/Institute etc. without proper citation and I shall be fully responsible for any plagiarism found at any stage.

*Name & Signature of the guide*

*Name & Signature of the student*



v. Format of the Fourth Certificate (APPROVAL i.e. Certificate of approval signed by guide and Principal/Director of the college/institute)

Reference No. ....

Date : .....

## Dissertation Approval Certificate

This is to certify that Mr. / Ms. < name of the student >, student of BCA (final semester) of ... < college /institute name >... , has successfully completed the project work entitled " <"Title of the Project"> under my guidance. I have regularly assessed the progress of the work and suggested the correction wherever required. The student has incorporated all the suggestions provided by me in this dissertation. This dissertation is bona fide piece of work of the standard of BCA project work carried out by the student under my supervision. Internal examination has been completed in my presence and student's performance was satisfactory and hence this dissertation is approved for the submission and valuation thereof.

*Signature of Guide*

Place:

Date:

*Signature of Principal /Director  
Seal of the Institute*

