## Bachelor in Computer Applications (BCA), Utkal University

Effective from 2016-17 Academic Session

<table>
<thead>
<tr>
<th>SEMESTER</th>
<th>COURSE OPTED</th>
<th>COURSE NAME</th>
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<tbody>
<tr>
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<td>Ability Enhancement Course-I</td>
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**ENGLISH**

**UNIT-I**

**Short Story:** Jim Corbett-The Fight between Leopards; Dash Benhur- The Bicycle

Dinanath Pathy- George V High School; Alexander Baron- The Man who knew too much; Will F Jenkins- Uneasy Homecoming

**UNIT-II**

**Prose:** C V Raman-Water- The Elixir of Life; Harold Nicolson- An Educated Person; Claire Needell Hollander- No Learning without Feeling; Steven Harvey- The Empty Page; Santosh Desai-Emoji Disruption

**UNIT-III**

Comprehension of a passage from any of the prescribed pieces and answering the questions

**UNIT-IV**

Expanding an idea into a paragraph
UNIT-V
Language exercises-test of vocabulary, usage and grammar based on the prescribed pieces

Prescribed Text


Suggested Reading:

*Fluency in English* – Part II, OUP, 2006

*Communicative English.* E. Suresh Kumar and P. Sreehari

PROGRAMMING USING C

UNIT- I

Introduction to Programming Language, Introduction to C Programming , Character Set, C Tokens, Keywords & Identifiers, Constants, Variables, Data Types, Variables , Storage Classes, Operators (Arithmetic, Relational, Logical , Assignment, Increment & Decrement, Conditional , Bitwise), Expressions , Input and Output Operations.

UNIT- II


UNIT- III


UNIT- IV

Pointers: Accessing the Address of a Variable, Declaring Pointer Variables, Initializations of Pointer Variable, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays, , Pointers and Character Strings, Array of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers to Structures, Troubles with Pointers.
UNIT- V


Recommended Books:

1. E. Balaguruswamy, "Programming in ANSI C", 4/e, (TMH)
2. Paul Deitel, Harvey Deitel, "C: How to Program", 8/e, Prentice Hall.
4. B. Kernighan & D.M. Ritche, "The C Programming Language", 2/e PHI

COMPUTER ORGANIZATION

UNIT-I


Number Systems: The Decimal System, Positional Number Systems, The Binary System, Converting Between Binary and Decimal (Integers, Fractions), Hexadecimal Notation.

UNIT-II

Computer Arithmetic: Arithmetic & Logic Unit, Integer Representation (Sign-Magnitude, Twos Complement, Range Extension, Fixed Point Representation), Integer Arithmetic (Negation, Addition and Subtraction, Multiplication, Division), Floating-Point Representation, (Principles, IEEE Standard for Binary Floating-Point Representation), Floating-Point Arithmetic (Addition and Subtraction, Multiplication and Division, Precision Considerations, IEEE Standard for Binary Floating-Point Arithmetic.

UNIT-III

Computer Evolution and Performance: History of Computers, Design for Performance (Microprocessor Speed, Performance Balance, Improvements in Chip Organization & Architecture), Multicore, MICs, and GPGPUs, Intel x86 Architecture, Embedded Systems and the ARM, Performance Assessment (Clock Speed and Instructions per Second, Benchmarks, Amdahl’s Law, Little’s Law.

UNIT-IV

Digital Logic: Boolean Algebra, Gates, Combinational Circuits (Implementation of Boolean Functions, Multiplexers, Decoders, Read-Only Memory, Adders), Sequential Circuits (Flip-Flops, Registers, Counters), Programmable Logic Devices (PLA, FPGA).
UNIT-V

Text Book:
William Stallings: Computer Organization and Architecture. 9/e

DISCRETE STRUCTURES

UNIT-I

UNIT-II

UNIT-III

UNIT-IV

UNIT-V
Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Havel-Hakimi Theorem, Representing Graphs and Graph Isomorphism, Connectivity, Cut-
Sets, Euler and Hamiltonian Paths, Shortest-Path Problem, Planar Graphs, Graph Coloring, Network Flows.

Recommended Books:


ENVIRONMENTAL SCIENCE

UNIT-I


UNIT-II

ENVIRONMENT POLLUTION: Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radiation Pollution, Natural Disasters and their Management.

UNIT-III

POPULATION ECOLOGY: Individuals, Species, Pollution, Community, Control Methods of Population, Urbanization and its effects on Society, Communicable Diseases and its Transmission, Non-Communicable Diseases.

UNIT-IV

ENVIRONMENTAL MOVEMENTS IN INDIA: Grass-root Environmental Movements in India, Role of Women, Environmental Movements in Odisha, State Pollution Control Board, Central Pollution Control Board.

UNIT-V


References

2. Rajamannar, 2004, Environmental Studies, EVR College pub, Trichy


PROGRAMMING USING C++

UNIT-I


UNIT-II

Functions in C++: The Main Function, Function Prototyping, Call By Reference, Return by Reference, Inline Functions, Default Arguments, Const. Arguments, Function Overloading, Friend & Virtual Functions, Math. Library Functions. Classes and Objects: Specifying a Class, Defining Member Functions, Making an outside Function Inline, Nested Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Cons. Member Functions, Pointer to Members, Local Classes.

UNIT-III

UNIT-IV

Inheritance: Defining Derived Classes, Single Inheritance, Making a Private Member Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes, Nesting of Classes. Pointers, Virtual Functions and Polymorphism: Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT-V


Recommended Books:

1. E. Balgurusamy, Object Oriented Programming with C++, 4/e (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program",9/e. Prentice Hall.

DATA STRUCTURE

UNIT-I


UNIT-II


UNIT-III

UNIT – IV

Queues: Definition, Representation of Queues (Array, Linked List), Circular Queue, Deque, Priority Queue, Application of Queues (Simulation, CPU Scheduling in Multiprogramming Environment, Round Robin Algorithm).

UNIT – V

Tree: Binary Trees, Properties of Binary Tree, Linear Representation of Binary a Binary Tree, Linked Representation of a Binary Tree, Physical Implementation of Binary Tree in Memory, Operations on Binary Tree (Insertion, Deletion, Traversal, Merging of two Binary Trees), Types of Binary Trees (Expression Tree, Binary Search Tree, Heap Tree, Threaded Binary Trees, Height Balanced Binary Tree, Weighted Binary Tree, Decision Trees).

Recommended Books:


NUMERICAL TECHNIQUES

UNIT – I


UNIT-II


UNIT-III

Numerical Integration: Trapezoidal Rule, Composite Trapezoidal rule, Simpson’s 1/3 rule, Simpson’s 3/8 rule, Gaussian Quadrature formulae (1-point, 2-point, 3-point)
UNIT-IV
Solution of System of Linear Equations: Gaussian Elimination method and Pivoting, LU factorization method, ill Conditioning, Iterative Methods: Jacobi iterative method, Gauss Seidel iterative method.

Eigen Values and Eigen Vectors: Eigen value properties, Computation Eigen values by Power method.

UNIT - V

Recommended Books:
1. E. Ward Cheney and David R. Kincaid ,“Numerical Methods and Applications” CENGAGE Learning India Private Ltd., New Delhi.
3. S.S. Sastry, " Introductory Methods of Numerical Analysis", 5/e, EEE

JAVA PROGRAMMING
UNIT-I
Introduction to Java: Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

UNIT-II
Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

UNIT-III

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata: Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

UNIT-IV

Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.

UNIT-V

Applets and Event Handling: Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

Recommended Books:

1. E. Balagurusamy, "Programming with Java", 4/e, TMH

COMPUTER ARCHITECTURE

UNIT-I


Internal Memory: Semiconductor Main Memory, Error Correction, Advanced DRAM Organization.
UNIT-II
External Memory: Magnetic Disk, RAID, Solid State Drivers, Optical Memory, Magnetic Tape.


UNIT-III
Instruction Sets Characteristics & Functions: Machine Instruction Characteristics, Types of Operands, Intel x86 & ARM Data Types, Types of Operations, Inter x86 & ARM Operation Types.

Instruction Sets Addressing Modes & Formats: Addressing Modes, x86 & ARM Addressing Modes, Instruction Formats, x86 & ARM Instruction Formats, Assembly Language.

UNIT-IV


UNIT-V


Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Debugging, Operating System Generations, System Boot.

UNIT- II


UNIT- III


UNIT- IV


UNIT- V


Recommended Books:


HTML Programming

Unit-I: Introduction
The Basics: The Head, the Body, Colors, Attributes, Lists, ordered and unordered
Unit-II: Links: Introduction, Relative Links, Absolute Links, Link Attributes, Using the ID Attribute to Link within a Document.

Unit-III: Images: Putting an Image on a Page, Using Images as Links, Putting an Image in the Background

Unit V: –Tables
Creating a Table, Table Headers, Captions, Spanning Multiple Columns, Styling Table

Unit V: –Forms: Basic Input and Attributes, Other Kinds of Inputs, Styling forms with CSS, Where To Go From Here

Book: Introduction to HTML and CSS --O'Reilly

STATISTICS AND PROBABILITY

UNIT-I

UNIT-II

UNIT-III
Sampling Distribution: sampling plans and experimental designs, Sampling distribution of a statistic, Central Limit theorem, Sampling distribution of the Sample mean and Proportion.

Large Sample Estimation: Point estimation, Interval estimation, Confidence interval of population mean, Population proportion, difference between two population means, difference between two population proportions.

UNIT-IV
Large Sample Tests of Hypothesis: Test of a Population mean, Test of difference of two population means, Test of hypothesis for a binomial proportion, Test of hypothesis for the difference between two binomial proportions.
Inference from Small Samples: Student’s t Distribution, Small Sample inferences concerning a population mean and difference between two population means, Inferences concerning a population variance and difference between two population variances.

UNIT-V

Analysis of Variance: One-way classification, Two-way classification.

Linear regression and Correlation: Method of least squares, Analysis of variance for linear regression, Testing the usefulness of the linear regression model, Estimation and Prediction using the fitted line. Carl Pearson’s coefficient of Correlation, Test of hypothesis concerning the Correlation coefficient.

Recommended Books:

1. William Mendenhall, Robert J. Beaver, Barbara M. Beaver, “Probability and Statistics” 14/e, CENGAGE Learning.

DATA COMMUNICATIONS

UNIT-I


UNIT-II


UNIT-III


UNIT-IV

Error Detection and Correction: Introduction, Block Coding, Linear Block Codes, Cyclic Codes, Checksum. Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol. Multiple Access:

UNIT-V


Recommended Books:


DATABASE SYSTEMS

UNIT-I


UNIT-II

Relational Model: The Relational Data Model and Relational Database Constraints, The Relational Algebra and Relational Calculus.

UNIT-III


UNIT-IV

Functional Dependencies and Normalization for Relational Databases, Relational Database Algorithms and Further Dependencies, Practical Database Design Methodology and use of UML Diagrams.

UNIT-V


Recommended Books:
MICROPROCESSOR

UNIT-I

UNIT-II
ARM Assembly Language Programming: Data processing instructions, Data transfer instructions, Control flow instructions, writing simple assembly language programs. ARM Organization and Implementation: Pipeline, Types, 3-stage pipeline ARM organization, 5-stage pipeline ARM organization, ARM instruction execution, ARM implementation, The ARM coprocessor interface.

UNIT-III
The ARM Instruction Set: Introduction, Exceptions, Conditional execution, Branch and Branch with Link (B, BL), Branch with Link and exchange (BX, BLX), Software Interrupt (SWI), Data processing instructions, Multiply instructions, Single word and unsigned byte data transfer instructions, Half-word and signed byte data transfer instructions, Multiple register transfer instructions, Status register to general register transfer instructions, General register to status register transfer instructions, Coprocessor instructions. Coprocessor data operations, Coprocessor data transfers, Coprocessor register transfers, Breakpoint instruction (BRK - architecture v5T only), unused instruction space, Memory faults, ARM architecture variants.

UNIT-IV
Architectural Support for High-Level Languages: Abstraction in software design, Data types, Floating-point data types, The ARM floating-point architecture, Expressions, Conditional statements, Loops, Functions and procedures, Use of memory, Run-time environment, Examples and exercises.
UNIT-V


Recommended Books:

PHP PROGRAMMING

UNIT-I Introduction to PHP: PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP, Expressions, scopes of a variable (local, global), PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator. PHP operator Precedence and associativity

UNIT-II Handling HTML form with PHP: Capturing Form Data, GET and POST form methods, Dealing with multi value fields, Redirecting a form after submission. PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For and Do While Loop, Goto, Break, Continue and exit

UNIT-III PHP Functions: Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local

UNIT-IV String Manipulation and Regular Expression: Creating and accessing String, Searching & Replacing String, Formatting, joining and splitting String, String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in regular expression.

UNIT-V Array: Anatomy of an Array, Creating index based and Associative array, Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.
PROGRAMMING in VISUAL BASIC

UNIT-I
GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs. Controls: Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

UNIT-II
Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data. Decision Making: If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

UNIT-III
Modular programming: Menus, sub-procedures and sub-functions defining / creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure. Forms Handling: Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms.

UNIT-IV
Iteration Handling: Do/loops, for/next loops, using msgbox function, using string function Arrays and Grouped Data Control: Arrays - 1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, two dimensional arrays. lists, loops and printing list boxes & combo boxes, filling the list using property window / additem method, clear method, list box properties, removing an item from a list, list box/ combo box operations.

UNIT-V
Database Connectivity: Database connectivity of forms with back end tool like mysql, populating the data in text boxes, list boxes etc. searching of data in database. using forms. Updating/ editing of data based on a criterion.
Books:
SOFTWARE ENGINEERING

UNIT-I


UNIT-II


UNIT-III


UNIT-IV


UNIT-V


Recommended Books:

COMPUTER GRAPHICS

UNIT-I


UNIT-II


UNIT-III

Three Dimensional Object Representations: Curved Surfaces, Quadratic Surfaces, Spline Representations, Bezier Spline Curves and Surfaces, B-Spline Curves and Surfaces, Octrees, BSP Trees, Fractal Geometry Methods, Gamma correction.

UNIT-IV


UNIT-V

Illumination Models: Basic Illumination Models, Displaying light Intensities, Halftone Patterns and Dithering techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading), Ray-Tracing Methods (Basic Ray-Tracing Algorithm, Ray-Surface Intersection Calculations). Computer Animation, Hierarchical Modeling (introductory idea only).
Recommended Books:


ACCOUNTING AND FINANCIAL MANAGEMENT

UNIT-I


UNIT-II

Cash & Bank; Bank Reconciliation, Fixed Assets, Liabilities & shareholders Equity, Expenses & Revenues, Depreciation, Preparation of Final Accounts : Profit and Loss Account, Balance Sheet.

UNIT-III

Analysis and Interpretation of Financial Statements: Ratio Analysis and Trend Analysis, Cost and cost Terminology, Classification of costs, Statement of costs.

UNIT-IV


UNIT-V

Budgetary Control System: Flexible Budgets, Master Budgets: Zero-base Budgeting Responsibility Accounting: Responsibility Centers, Management Control Systems

References_Books

1. T. S. Grewal : Introduction to Accounting (S.Chand )
2. Jain & Narang : Introduction to Cost Accounting(Kalyani’s)
3. S. N. Maheshwari : Management Accounting
5. Jawaharlal: Cost Accounting (Tata Mc Graw Hill)
6. Nigam & Jain: Cost Accounting (PHI)

ASP.NET

UNIT-I


UNIT-II


UNIT-III


UNIT-IV

BUILDING WEB SERVICES: Introduction to web services – Web services Infrastructure – SOAP – Building a web service – Deploying and publishing web services – Finding web services – Consuming web services.

UNIT-V

ADO.NET: Basics of ADO .NET – Changes from ADO – Data Table – Data Views – Data Set – Data Relation Type – ADO .NET Managed Providers – OleDb and SQL Managed Providers – OleDb Data Adapter Type.

Text Books:

Reference Books:
INTERNET TECHNOLOGY

UNIT-I
Java: Use of Objects, Array and ArrayList class

UNIT-II
JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT-III

UNIT-IV
JSP: Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT-V
Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Recommended Books:

2. Cay Horstmann, BIG Java, Wiley Publication , 3/e, 2009

MULTIMEDIA AND APPLICATIONS

UNIT-I
UNIT-II

UNIT-III

UNIT-IV
Internet and Multimedia: www and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders.

UNIT-V
Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.

BOOKS

E-COMMERCE
UNIT-I

UNIT-2
The Internet and WWW: Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner, Exchange, Shopping Bots.
UNIT-III

UNIT-IV

UNIT-V

Books
2. E- Commerce:- Kamlesh K Bajaj and Debjani Nag
3. Electronic commerce:- Gray P. Schneider