



BCA (Bachelor of Computer Application)
BCA (Semester-IV)

Course Code	US04CBCA51	Title of the Course	Object Oriented Programming – II
Total Credits of the Course	4	Hours per Week	4
Course Objectives:	1. To introduce basic programming concepts and necessary constructs of the Java programming language. 2. To understand the fundamental concepts of object-oriented programming using Java. 3. To describe exception handling and Input Output Management. 4. To understand Applet programming using Abstract Windows Toll Kit (AWT).		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction <ul style="list-style-type: none">– Introduction to salient features of Java and Java Virtual Machine (JVM)– Structure of a Java program– Tokens, comments, constants, variables and data types, scope of variables, type casting– Operators: arithmetic, relational, logical, assignment, increment/decrement, conditional, ternary operator & special operators– Decision making: if and switch statements– Looping: while, do...while, for and for each loop– Arrays : one and two dimensional arrays	25
2.	Classes, Objects, Interfaces and Inheritance <ul style="list-style-type: none">– Defining a class, members of a class: variables and methods, creating objects, constructors, accessing class members– Encapsulation– Static members v/s instance members– Introduction to inheritance, <i>this</i> and <i>super</i> keywords– Interfaces– Final variables, methods and classes, abstract methods and classes– Introduction to method overloading and overriding	25
3.	Exception Handling, I/O Management and Packages <ul style="list-style-type: none">– Managing errors & exceptions: introduction, types of errors, exceptions, syntax of exception handling construct, multiple catch statements, the finally clause, defining and throwing user-defined	25





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	exceptions, the throw statement – Managing I/O files : introduction, concept of streams – Character stream classes – Introduction to the concept of a package, Java API packages, using the System package	
4.	Applet Programming – Applet architecture and skeleton – java.awt package (Button, CheckBox, CheckBoxGroup, Choice, Color, Label, List, TextArea, TextField) – HTML applet tag, display techniques (DrawString, Lines, Rectangle, Ellipses, Circles, Arcs, Polygons, Color) – Introduction to event handling	25

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Understanding of the basic programming concepts and necessary constructs of the Java programming language.
2.	Understanding of the fundamental concepts of object-oriented programming using Java.
3.	Ability to describe exception handling and Input Output Management.
4.	Understanding of Applet programming using Abstract Windows Tool Kit (AWT)





Suggested References:

Sr. No.	References
1.	Programming with Java- A Primer by E. Balaguruswami, 3 rd Edition, TMH Publication.
2.	The Complete Reference – Java 2 7 th Edition Herbert Schildt. TMH Publication.
3.	Saba Zame , Handbook of Object technology, CRC Press, Washington DC, 1999.
4.	Mary Champion and Kathy Walrath, Java tutorial, Second Edition, Addison Wesley Pun. 1998.
5.	Java 2 Programming Black Book, Steven Holzner.

On-line resources to be used if available as reference material

On-line Resources

1. <https://www.tutorialspoint.com/>

2. <https://www.w3schools.com/>

3. <https://www.javatpoint.com/>





BCA (Bachelor of Computer Application)
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Course Code	US04BCA52	Title of the Course	Data Structures- II
Total Credits of the Course	4	Hours per Week	4
Course Objectives:	1. To study basic concepts related to trees and linked lists. 2. To learn the fundamentals of sorting and searching techniques. 3. To understand the concepts related to file organization.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction to trees <ul style="list-style-type: none">– Definitions of basic terms : Tree, Directed Tree, Root, Leaf, Branch, Level, Node, Forest– Applications of a tree– Binary trees : introduction, linear and linked representations– Traversal of a binary tree: Preorder, Inorder and Postorder (Recursive)– Insertions and deletions in a lexically ordered binary tree– Types of Binary Tree : Full Binary Tree, Complete Binary Tree, Binary Search Tree	25
2.	Linked List <ul style="list-style-type: none">– Introduction to linked lists– Types of linked lists: Singly linked lists, Doubly linked lists, Circular linked lists, Circular Doubly linked list– Operations on Singly Linked Lists:– Insertion: At Front, At Any Position, At End– Deletion: From Beginning, From Any Position, From End	25
3.	Sorting and Searching techniques <ul style="list-style-type: none">– Sorting – Introduction, Applications of sorting– Sorting Techniques - Bubble Sort, Quick Sort and Merge Sort– Searching – Introduction, Applications of searching– Searching Techniques - Sequential search and Binary search– Sorting vs. searching	25
4.	File Organization – II <ul style="list-style-type: none">– Hashing Functions: The Division Method, The Midsquare Method, The Folding Method, Digit Analysis, The length-Dependent Method– Collision-Resolution Techniques	25





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	<ul style="list-style-type: none">– Direct files, Processing direct files– The structure of indexed sequential files, Processing indexed sequential files	
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Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Understanding of the basic concepts related to trees and linked lists.
2.	Understanding of the fundamentals of sorting and searching techniques.
3.	Ability to understand the concepts related to file organization.

Suggested References:	
Sr. No.	References
1.	Tremblay J. & Sorenson P. G.: An Introduction to Data Structures with Applications, 2 nd Edition, Tata McGraw-Hill Edition, 1991.
2.	Singh Bhagat & Naps Thomas : Introduction to Data Structures, Tata McGraw-Hill Publishing Co.Ltd.,1985.
3.	R. B. Patel: Data Structure using C – Khanna Publications. ISBN: 81-87522-41-0.
4.	D. Samanta - Classis Data Structures, 2 nd Edition – PHI Publication.
5.	G. S. Baluja - Data Structures through C, 4 th Edition – Dhanpat Rai & Co.





On-line resources to be used if available as reference material

On-line Resources

1. https://www.tutorialspoint.com/
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2. https://www.w3schools.com/
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3. https://www.javatpoint.com/
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Course Code	US04CBCA53	Title of the Course	Visual Programming
Total Credits of the Course	4	Hours per Week	4
Course Objectives:	<ol style="list-style-type: none"> 1. To understand .NET Framework and describe some of the major enhancements to the new version of Visual Basic. 2. To describe the basic structure of a Visual Basic.NET project and use main features of the Integrated Development Environment (IDE). 3. To understand how to create applications using Microsoft Windows Forms. 4. To understand Exception handling. 5. To understand and create applications that use ADO. NET 		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction to .NET Framework (4.5) and VB.NET <ul style="list-style-type: none"> – .NET Architecture, – .NET Languages, Microsoft Intermediate Language (MSIL), – The Just-In-Time (JIT) compiler, – Working with Assemblies, – The .NET framework class library VB.NET – introduction, applications and types of project – Introduction to Visual Studio IDE – Creating simple Windows Application using VB.NET Variables, data types, constants and operators Type casting, Boxing and Unboxing, Working with arrays and strings 	25
2.	Fundamentals of VB.NET <ul style="list-style-type: none"> – VB.NET Basics – Use of conditional statement (if) – Multi branching statement (select) and With...End With statement, – Looping Statement: DO, FOR, FOR EACH..NEXT and WHILE, – Working with EXIT, CONTINUE and WITH statements – Working with procedures – introduction, types, use of parameters, parameter passing, calling procedures – OOP concepts - Encapsulation, Inheritance, – Interfaces and Polymorphism – Working with modules, classes (partial) and namespaces – Working with Windows Forms – introduction, life cycle, basic properties, methods and events, use of simple windows forms control. – Working with SDI and MDI forms 	25





3.	<p>Developing Windows Forms, Exception Handling</p> <ul style="list-style-type: none"> – Working with basic controls – Button, CheckBox, CheckedListBox, ComboBox, DateTimePicker, GroupBox, HScrollBar, RadioButton, VscrollBar, Label, ListBox, PictureBox, TextBox and Timer controls. – Working with advanced controls – LinkLabel, RichTextBox, ColorDialog, FontDialog, TreeView, Error Provider Control, – Error Handling: exception, structured exception using try...catch and final statement 	25
4.	<p>Database with ADO.NET</p> <ul style="list-style-type: none"> – Persisting Data Using Databases and Files – ADO.NET introduction, applications and architecture (connected and disconnected) – Database connectivity using ADO.NET Use of Data sources, – Server Explorer and working with DataSet Populating data in a DataGridView – Working with report 	25

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to understand	
1.	The .NET Framework and describe some of the major enhancements to the new version of Visual Basic.
2.	The basic structure of a Visual Basic.NET project and use main features of the integrated development environment (IDE).
3.	How to create applications using Microsoft Windows Forms.
4.	The basic concepts related to Exception handling.





5.	How to develop applications that use ADO. NET.
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Suggested References:	
Sr. No.	References
1.	Steven Holzner; VB.NET Black Book by Dreamtech publication.
2.	Francesco Balena : Programming Microsoft Visual Basic.NET, Microsoft Press, Bill Evjen, Billy Hollis, Bill Sheldon, Kent Sharkey and Tim McCarthy : Professional VB 2005 with .NET 3.0

On-line resources to be used if available as reference material
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1. https://www.tutorialspoint.com/
2. https://www.w3schools.com/
3. https://www.javatpoint.com/





BCA (Bachelor of Computer Application)
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Course Code	US04BCA54	Title of the Course	Operating Systems
Total Credits of the Course	4	Hours per Week	4
Course Objectives:	1. To provide basic understanding of the role and functioning of an operating system. 2. To introduce the basic concepts related to processor management, memory management, process synchronization and deadlocks. 3. To impart fundamental knowledge on Linux shell environment and programming.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction and Scheduling <ul style="list-style-type: none">– Introduction to Operating System, Operating System Services– Different types of Operating Systems: Real time, Time sharing, Distributed and Multiprogramming.– OS Structure – Simple Structure, Layered Approach, Microkernel.– CPU Scheduling: Introduction to process, process control block, process scheduling, FCFS Scheduling, SJF scheduling, Priority scheduling, Round Robin scheduling	25
2.	Memory Management <ul style="list-style-type: none">– Memory Management: Concept, Basic memory management techniques– Swapping, Paging, The concept of a Page Fault– Page Replacement Algorithms: FIFO,LRU,OPT– The concept of virtual memory– Demand Paging	25
3.	Process Synchronization, Deadlocks and Introduction to Linux <ul style="list-style-type: none">– Introduction to Cooperating processes– Process Synchronization– Introduction to Critical Section Problem– Two process solution– The concept of a Deadlock and characterization– Introduction to Linux Operating System– Features of Linux	25
4.	Basic Linux commands <ul style="list-style-type: none">– Basic Commands: login, logout, date, man, pwd, who, dir, ls, cd,	25





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	<ul style="list-style-type: none"> mkdir, rmdir, wc, echo – Use of Wild card characters – Types of FAP(File Access Permission), use of chmod command – Basic commands like cp, mv, rm, rev, file redirection, grep, cut, paste, find, sort commands with example – Introduction to shell script: execution of it, shell script variable, expr, test commands – Control structures: if, if..else, case structure – Iteration: while, for construct, break, continue, exit commands 	
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Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to develop	
1.	Ability to describe the role and functioning of an operating system.
2.	Understanding of fundamental concepts related to memory management, process synchronization and deadlocks.
3.	Familiarity with Linux command-line environment.
1.	Knowledge of basic Linux commands.
2.	Ability to develop Linux shell scripts.

Suggested References:	
Sr. No.	References





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1.	Andrew S. Tanenbaum: Operating System design & Implementation, Prentice Hall International
2.	James Peterson and Abraham Silberschatz: Operating System Concepts, Addison Wesley
3.	Bryan Pfaffenberger - Linux Commands Instant reference , BPB Publication
4.	Sumitabha Das - UNIX , Concepts and Applications – Tata McGraw-Hill Publications
5.	Advanced Linux Programming – Samuel, Techmedia Publications

On-line resources to be used if available as reference material

On-line Resources

1. <https://www.tutorialspoint.com/>

2. <https://www.w3schools.com/>

3. <https://www.javatpoint.com/>





BCA (Bachelor of Computer Applications)
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Course Code	US04CBCA55	Title of the Course	Practicals-I
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	<ol style="list-style-type: none">1. To solve problems using Java programming language.2. To implement Applet Programming.3. To implement various data structures using Java programming.
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Course Content		
Sr. No.	Description	Weightage* (%)
1.	Part-1 : Practical based on US04CBCA51	60
2.	Part-2 : Practical based on US04CBCA52	40

Teaching-Learning Methodology	Project-based learning in small groups and Hands on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	gain knowledge to solve problems using Java programming language.
2.	gain knowledge to implement Applet Programming.
3.	gain knowledge to implement various data structures using Java programming.





BCA (Bachelor of Computer Applications)
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Course Code	US04CBCA56	Title of the Course	Practicals-II
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	<ol style="list-style-type: none">1. To understand implementing problems using Visual Basic.NET2. To understand implementing database programming using ADO.NET3. To understand Operating System's working4. To understand basics of Linux operating system.
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Course Content		
Sr. No.	Description	Weightage* (%)
1.	Part-1 : Practical based on US04CBCA53	60
2.	Part-2 : Practical based on US04CBCA54	40

Teaching-Learning Methodology	Project-based learning in small groups and Hands on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	gain knowledge in implementing problems using Visual Basic.NET.
2.	gain knowledge in implementing database programming using ADO.NET.
3.	gain knowledge in understanding Operating System's working.
4.	gain knowledge in understanding basics of Linux operating system.





BCA (Bachelor of Computer Application)
BCA (Semester-IV)

Course Code	US04ABCA51	Title of the Course	Fundamentals of Operations Research
Total Credits of the Course	2	Hours per Week	4
Course Objectives:	1. To learn about formulating a problem and different methods to solve it. 2. To understand the techniques for decision making. 3. To improve mathematical as well as logical skills.		

Course Content		
	Description	Weightage* (%)
	Practicals Based on Topics <ul style="list-style-type: none"> – Linear Programming Problem: formulation, feasible region, Basic and Unbounded solution, Standard form. – Graphical solution (Maximization & Minimization), Simplex method (Maximization), Big M method (Maximization) – Mathematical model of Transportation Problem, Initial Basic Feasible Solution by North-West corner rule, Least-cost method and Vogel's Approximation Method (VAM). – Travelling Salesman Problem – Assignment Problem (AP), Mathematical model of AP, Solution of AP by Hungarian method (Balance & minimization). – Dynamic programming, Deterministic & Probabilistic dynamic programming (types only), shortest route problem. – Sequencing problem, N-jobs through 2 machines – Applications of PERT & CPM, Rules for Network construction, Critical path calculations, Total & Free float. 	100

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%





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Course Outcomes: Having completed this course, the learner will be able to

1.	Understand how formulate the problem and different methods to solve it.
2.	Understand the techniques for decision making.
3.	Understand how to improve mathematical as well as logical skills.

Suggested References:

Sr. No.	References
1.	Sharma S.D.: Operations Research. KedarNath Ram Nath & Co. Meerut, 1988-89. (fifteenth edition)
2.	Operation Research (For managerial decision making) 5 th revised edition by V. K. Kapoor, Sultan Chand & sons.
3.	J.K.sharma: Operation Research.
4.	Gillett B. E.: Introduction to Operations Research - a computer oriented algorithmic approach, McGraw-Hill, 1976.





BCA (Bachelor of Computer Application)
BCA (Semester-IV)

Course Code	US04SBCA51	Title of the Course	Multimedia Technology
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	<ol style="list-style-type: none">1. To introduce fundamental concepts related to multimedia technology.2. To provide basic understanding of working with text, audio, video and graphics.3. To impart basic knowledge on multimedia animation.4. To introduce various multimedia authoring systems.5. To impart knowledge on development of various multimedia applications.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction <ul style="list-style-type: none">– Multimedia : meaning– Various facets of multimedia : text, audio, video, animation graphics– Classification of multimedia technology– Multimedia : hardware/software essentials, different categories of multimedia software.	25
2.	Working with Text, Audio <ul style="list-style-type: none">– Multimedia Text: Introduction, designing text for multimedia, hypermedia, hypertext– Multimedia Audio : Introduction, digital audio and sound card fundamentals, sound card functionalities, audio jacks, connectors, digital audio playback, audio editing	25
3.	Working with Graphics and Video <ul style="list-style-type: none">– Multimedia Graphics : Introduction, basic concepts of color displays, color depth, Resolution, Digital Imaging, Camera specification, Graphics editing concepts.– Multimedia Video : Introduction, video in multimedia projects, digital video fundamental, full motion and full screen videos, digital video files sizes, digital video production techniques – video production in multimedia, shooting the sequences, video capture techniques, video capture boards, video capture software, editing video, embedding sound clips.	25





4.	<p>Multimedia Animation, Project and Authoring</p> <ul style="list-style-type: none"> – Multimedia Animation: introduction, classifications, two-dimensional animation and three dimensional animation technology, animation development process, names of animation software tools for 2D and 3D – Multimedia project design concepts – introduction, concept and design, various facets, media content design and development, interface design and development process. – Multimedia authoring: introduction, authoring methodologies, characteristics of authoring tools, Commercial authoring tools. 	25
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Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	understand fundamental concepts related to multimedia technology.
2.	understand how to work with text, audio, video and graphics.
3.	discuss the concepts related to multimedia animation and multimedia authoring systems.
4.	develop various multimedia applications.

Suggested References:	
Sr. No.	References
1.	Multimedia Magic. By S. Gokul, BPB Publications, 1998 and (Revised and updated Second Edition) 2005.
2.	Introduction to Multimedia : By Ana Weston Solomon, Tata McGraw-Hill Publishing Company Limited, 2005.





BCA (Bachelor of Computer Application)
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Course Code	US04SBCA52	Title of the Course	Business Information Systems
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	<ol style="list-style-type: none">1. To learn Business Information System (BIS), its feature and component.2. To learn strategy of IT Infrastructure and corporate Environment.3. To understand of Business Functions and Information Needs of Business.4. To introduce Managerial Process with Implications for Information System.5. To introduce planning for IT Infrastructure for best Business.6. To identify IT applications and Assessing Risk In Realization of Benefits.		

Course Content		
Unit	Description	Weightage* (%)
1.	Business Information System <ul style="list-style-type: none">– Introduction to BIS– Features of BIS– Users of BIS.– Components of BIS.– Characteristics, Features of new IT Infrastructure– Changing the corporate environment.	25
2.	Business Functions and Information Needs of Business <ul style="list-style-type: none">– Introduction to Basic Business Functions.– Marketing Function and Information Needs.– Finance Function and Information Needs.– Production Function and Information Needs.– Human Resource Management and Information Needs.– Information Management as Business Function.	25
3.	Information System and Managerial Process <ul style="list-style-type: none">– Introduction to Managerial Process.– Managerial Decision Making– Approaches to Managerial Decision Making– Decision Making Environment.– Implications for Information System.	25





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4.	Planning for IT Infrastructure <ul style="list-style-type: none">– Introduction– Portfolio Approach.– Identifying IT applications.– Techniques of Evaluating IT Investments.– Assessing Risk In Realization of Benefits.	25
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Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	the basic concepts related to Business Information Systems.
2.	various business functions and information needs of a business.
3.	various managerial processes and information systems.
4.	necessary planning for IT infrastructure.

Suggested References:	
Sr. No.	References
1.	Business Information System, Muneesh Kumar, Publisher : Vikas Publishing House Pvt Ltd.
2.	Introduction to Information Technology, Turban, Rainer, Potter, John Wiley & Sons Inc., 2000





BCA (Bachelor of Computer Application)
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Course Code	US04SBCA53	Title of the Course	System Software
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	1. To study the fundamental concepts related to system software. 2. To learn basics of language processors and compilers. 3. To understand the fundamentals of an assembly Language and the role of an assembler. 4. To study basics of editors, macros, linkers, and loaders. 5. To discuss various system software tools.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction to Language Processors and Compilers – Classification of Software, Introduction to System Software, Overview of Addressing Modes and Instruction Formats, Concept of Execution by OS and Executable Files, Language Processing Activities, Phases of Compilation Process, Compiler vs. Interpreter, Cousins of a Compiler	25
2.	Fundamentals of Assembly Language and Assemblers – Elements of Assembly Language Programming, A Simple Assembly Language Scheme, Description of different types of Assembly Language Statements: Imperative Statements, Declaration Statements, Assembler Directives, Advantages of Assembly Language, Forward Reference, Pass and Types of Assemblers	25
3.	Editors, Macros, Linkers, and Loaders – Editors: Overview of the Editing Process, Types of Editors: Line Editors, Stream Editors, Screen Editors, Word Processors, Structure Editors, Syntax Directed Editor, Design of Editors/Editor Structure – Linkers: Introduction: Translated, Linked and Load Time Addresses, Relocation and Linking Concepts, Program Relocation, Self-Relocating Program – Loaders: Basic functions of Loader, Types of Loaders – Macros: Macro Definition and Call, Macro Expansion	25





4.	System Software Tools <ul style="list-style-type: none">– Language Processor Development Tools: Introduction to Software Tools for Program Development and their description– Debug Monitors: Interactive Debugging System and its usefulness, Debugging Functions and Information– User Interface: Design Criteria and Examples– Device Driver: Role of Device Drivers, Examples of Device Drivers	25
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Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	understand the fundamental concepts related to system software.
2.	discuss basics of language processors and compilers.
3.	understand the basics of an assembly Language and the role of an assembler.
4.	understand the basics of editors, macros, linkers, and loaders.
5.	discuss various system software tools.

Suggested References:	
Sr. No.	References
1.	Dhamdhare D. M., “Systems Programming and Operating Systems”, Second Revised Edition, Tata McGraw-Hill Company Limited, 2004.
2.	Leland L. Beck, “System Software - An Introduction to Systems Programming”, 3rd Edition, Pearson Education Asia, 2000.
3.	Dhamdhare, Introduction to System Software, McGraw Hill.





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4.	Aho. A.V., Sethi R. and Ulman J.D, “Compilers, Principles, Techniques and Tools”, Addition-Wesley Publishing Company, 1988/Pearson.
5.	Srimanta Pal, Systems Programming, Oxford University Press. John Donovan, System Programming, TMH.
6.	Leland L. Beck and D. Manjula, System Software-An Introduction to Systems Programming, Pearson.
7.	Das, Compiler Design Using Flex and Yacc, PHI.
8.	John J. Donovan “Systems Programming”, Tata McGraw-Hill Edition, 1972.
9.	John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000





BCA (Bachelor of Computer Application)
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Course Code	US04SBCA54	Title of the Course	Artificial Intelligence
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	1. To introduce the term Artificial Intelligence and its related domains. 2. To study basic concepts related to expert systems. 3. To learn various search methods. 4. To understand various knowledge representation methods. 5. To introduce various application areas of AI such as Natural Language Processing, game playing, and robotics.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction <ul style="list-style-type: none">– Concepts and Definitions of AI– Brief history of AI– AI and related fields	25
2.	Expert Systems <ul style="list-style-type: none">– Introduction– Characteristics of Expert System– Representing and Using Domain knowledge– General Structure of Expert Systems– Expert System Shell– Advantages and Disadvantages of Expert system	25
3.	Introduction to AI techniques and Application Areas-I <ul style="list-style-type: none">– Introduction to Basic search strategies: Some examples and Classification– Introduction to Heuristic Search technique: Depth First Search– Using Predicate Logic– Representing simple facts in logic, video, embedding sound clips.	25
4.	Introduction to AI techniques and Application Areas-II <ul style="list-style-type: none">– Introduction to Fuzzy logic– Introduction to various application areas of AI like: Natural Language Processing, Game Playing, Robotics	25

Teaching-	Blended learning approach incorporating both traditional classroom
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Learning Methodology	teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	the term Artificial Intelligence and its related domains.
2.	basic concepts related to expert systems.
3.	various search methods.
4.	various knowledge representation methods.
5.	various application areas of AI such as Natural Language Processing, game playing, and robotics.

Suggested References:	
Sr. No.	References
1.	Elain Rich : Artificial Intelligence, McGraw Hill, 2001.
2.	Patterson, Dan W. : Introduction to Artificial Intelligence, Prentice Hall of India (PHI).
3.	R.Akerkar : Introduction to Artificial Intelligence, PHI, 2005
4.	S. Russell and P. Norvig, Modern Approach to Artificial Intelligence, Prentice Hall of India Ltd., 2006.
5.	George Luger, Artificial Intelligence, 5th Edition, Addison Wesley, 2004.





BCA (Bachelor of Computer Application)
BCA (Semester-IV)

Course Code	US04SBCA55	Title of the Course	System Security
Total Credits of the Course	4	Hours per Week	4
Course Objectives:	1. To acquire basic knowledge about security attacks, security services and a network security model. 2. To understand the fundamental concepts related to cryptography. 3. To develop understanding about the concepts related to viruses. 4. To acquire basic knowledge about digital signatures and firewalls.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction – Security attacks – Security services – security mechanisms – A model for network security	25
2.	Cryptography – Introduction – Conventional encryption principles – Basic terms : plaintext, cipher text, cryptography, cryptanalysis – Substitution ciphers vs. transposition ciphers – Introduction to secret key algorithms and public key algorithms	25
3.	System Security – Intruders – Viruses and related threats : trap doors, logic bombs, Trojan horses – worms – The nature of viruses – Types of viruses – Antivirus approaches : detection, identification and removal	25
4.	Network Security – Digital signatures – Firewalls : introduction, design principles, characteristics, types, configuration	25

Teaching-	Blended learning approach incorporating both traditional classroom
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Learning Methodology	teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Basic knowledge about security attacks, security services and a network security model.
2.	Understanding of the fundamental concepts related to cryptography.
3.	Understanding about the concepts related to viruses.
4.	Fundamental knowledge about digital signatures and firewalls.

Suggested References:	
Sr. No.	References
1.	William Stallings: Network Security Essentials (Applications and Standards), Pearson Education India, 2001.
2.	Behrouz Forouzan, Introduction to Data Communications and Networking, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 1998.





BCA (Bachelor of Computer Application)
BCA (Semester-IV)

Course Code	US04SBCA56	Title of the Course	Software Project Management
Total Credits of the Course	2	Hours per Week	2
Course Objectives:	<ol style="list-style-type: none">1. To develop understanding about the concepts related to software project management.2. To learn the phases of a software project life cycle.3. To acquire knowledge about a software process, project metrics and software project planning.4. To understand software project estimation and risk management.5. To study the concepts related to project scheduling and tracking.		

Course Content		
Unit	Description	Weightage* (%)
1.	Introduction <ul style="list-style-type: none">– Overview of a Project, Project types and operations, Program, Portfolio and Management– Characteristics and Goals of a Project– Project Execution and Stakeholders– Project Management with its cross functional nature– 4P's for effective Project Management– Principles of Project management– Software Project Life cycle phases	25
2.	Software Process, Project Metrics and Software Project Planning <ul style="list-style-type: none">– Overview of Measures, Metrics, And Indicators– Metrics in the Process And Project Domains– Software Measurement– Metrics For Software Quality– Project Planning Objectives– Software Scope: Obtaining necessary information and Feasibility– Resources	25
3.	Software Project Estimation and Risk Management <ul style="list-style-type: none">– Software Project Estimation– Decomposition techniques: Software sizing, Problem based estimation, Process based Estimation– Empirical estimation models: COCOMO model– Concept of Risk, Type of Risks– Risk Identification with Components and drivers	25





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	<ul style="list-style-type: none"> – Risk Assessment – Risk Mitigation, Monitoring and Management 	
4.	Project Scheduling and Tracking <ul style="list-style-type: none"> – Introduction to Project Scheduling – Principles guide for Software Project Scheduling – Work Breakdown Structure(WBS) – Selecting Software Engineering Task – Concept of Task network and Scheduling Tool: Timeline Chart (Gantt Chart) – Concept and ways of Tracking the schedule 	25

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	University Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	understanding about the concepts related to software project management.
2.	ability to describe the phases of a software project life cycle.
3.	knowledge about a software process, project metrics and software project planning.
4.	understanding about software project estimation and risk management.
5.	ability to discuss the concepts related to project scheduling and tracking.

Suggested References:	
Sr. No.	References
1.	Roger S. Pressman, “Software Engineering”, 2001, McGraw Hill.
2.	S.A.Kelkar, “Software Project Management – A concise study”, 2nd Ed. PHI learning Pvt. Ltd. 2009.





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3.	Walker Royce, “Software Project Management – A Unified Framework”, 2001, Pearson Education.
4.	Ian Sommerville, “Software Engineering”, 2004, Addison Wesley.
5.	Pankaj Jalote “An Integrated Approach to Software Engineering” 2nd Edition.

