NETAJI SUBHAS UNIVERSITY

Estd. Under Jharkhand State Private University Act, 2018

Department of Information Technology (IT)

Bachelor of Computer Applications (BCA)

Course Curriculum

(with CO, PO Structure)

w.e.f. 2018

NETAJI SUBHAS UNIVERSITY

SCHEME AND SYLLABUS

BCA

(Bachelor of Computer Application)

(Effective from Academic Year: 2018)

Head
Department of IT
Netaji Subhas University

Dean Academics
Netaji Subhas University
Jamshedpur, Jharkhand

VISION:-

To achieve global excellence in education, research, and development in Information Technology by embracing rapid technological advancements.

MISSION:-

- To produce technologically competent and ethically responsible graduates through balanced and dynamic curriculum.
- To take up creative research in collaboration with Government, Industries and professional societies to make the nation as a knowledge-power.
- To produce successful graduates with personal and professional responsibilities and commitment to lifelong learning.

PEOs (Program Educational Objectives)

PEO1: Industry-Ready Professionals: Graduates will be prepared to pursue successful careers in Information Technology, equipped with the technical, analytical, and problem-solving skills necessary to work in diverse sectors such as software development, network administration, cybersecurity, data analytics, and IT consulting.

PEO2: Adaptation to Technological Advancements: Graduates will demonstrate the ability to adapt to rapidly changing technologies and trends in the IT industry, utilizing lifelong learning and professional development to stay current with emerging technologies such as AI, cloud computing, and the Internet of Things (IoT).

PEO3: Effective Teamwork and Communication: Graduates will be capable of working effectively in multidisciplinary teams, demonstrating strong communication, collaboration, and leadership skills to address complex IT-related challenges and contribute to organizational success.

PEO4: Ethical and Responsible Practice: Graduates will apply ethical principles and a sense of responsibility to their professional work, ensuring that technology is used in a manner that is socially, economically, and environmentally sustainable, while adhering to legal and regulatory frameworks.

PEO5: Entrepreneurial and Research Mindset: Graduates will exhibit an entrepreneurial mindset and the ability to engage in research and development activities, contributing innovative solutions to solve real-world problems, and potentially launching new IT-based ventures or pursuing higher education opportunities.

Programme Specific Outcomes

PSO1: Understand the Opportunities and Challenges in Industry and to equip the students accordingly

PSO2: Apply effectively the principles and methods of Computer Technology to a wide range of applications.

PSO3: Apply advanced algorithmic and mathematical concepts to the design and analysis of software.

PSO4: Get proficiency of computing, and to prepare themselves for a continued professional development.

PSO5: Understand networking concepts, protocols, and cybersecurity principles to ensure secure and efficient data communication.

PSO6: Apply mathematical and logical reasoning skills to develop algorithms and optimize computational solutions.

PSO7: Adapt to new and evolving technologies such as Cloud Computing, IoT, AI, and Blockchain for innovation in computing solutions.

PSO8: Demonstrate ethical responsibility, teamwork, leadership, and effective communication in a professional computing environment.

PSO9: Develop problem-solving abilities, business acumen, and project management skills to excel in IT careers or start entrepreneurial ventures.

PSO10: Build dynamic web and mobile applications using front-end and back-end technologies to meet industry and user requirements.

Program Outcome

PO1: Focuses on building a strong theoretical foundation and a solid understanding of computing systems, algorithms, and mathematical methods that underpin software and technology.

PO2: Encourages students to develop strong problem-solving and analytical skills, making them capable of addressing complex issues in real-world computing scenarios.

PO3: Relates to the design aspect of the MCA program, where students are expected to design software solutions, considering various constraints like time, resources, and ethical implications.

PO4: Emphasizes research skills, enabling students to conduct investigations into complex problems and come up with efficient, effective solutions.

PO5: Highlights the importance of modern tools and technology in the field of computing, ensuring that students are up to date with the latest tools and technologies.

PO6: Ensures that students understand the ethical implications of their work, and how professional ethics guide responsible computing practices.

PO7: Focuses on enhancing communication skills, which are critical for presenting technical solutions to non-technical audiences and for effective teamwork.

PO8: Ensures that MCA students are not only capable of working alone but also excel in collaborative environments, a crucial skill in industry settings.

PO9: Focuses on management skills, preparing students for leadership roles and the ability to handle project deadlines, budgets, and team coordination.

PO10: Emphasizes the need for lifelong learning, helping students stay adaptable and up-to-date with the evolving field of computer applications.

SEMESTER-I

SEMESTER - 1									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	IA	ESE	SUB-TOTAL		
BCA 101	Communicative English	4	0	0	30	70	100	4	4
BCA 102	Basic Mathematics	4	0	0	30	70	100	4	5
BCA 103	Information Technology & Application	4	0	0	30	70	100	4	4
BCA 104	Programming in C	4	0	0	30	70	100	4	4
BCA 105	Principle of Programming	4	1	0	30	70	100	5	5
BCA 106	Information Technology & Application LAB	0	0	4	20	30	50	2	4
BCA 107	Programming in C LAB	0	0	4	20	30	50	2	4
							Total Credits:	25	

IA = Internal Assessment, **ESE** = End Semester Exam

BCA 101 –Communicative English

Syllabus

Introduction:

Definition, Objectives, Stages of Communication, Essentials of Good/Effective Communication, Benefits of Good Communication, Gaps in Communication, Communication and Information Technology.

Business Correspondence:

Structure of a Letter, Inquiry Letter, Sales Letter, Order Letter, Complaints, Complaint Handling, Telemarketing.

Government Correspondence:

Noting, Routine Letter, Demi-Official Letter Memorandum, Circular, Telegrams, Newsletter.

Writing Skills:

Report Writing, Scientific Paper Writing, Writing Small Paragraphs & Essays, Composition.

Grammar:

Sentence Structure, Idiomatic Usage of Language, Tenses, Direct & Indirect Parts of Speech, Active & Passive Voice, Vocabulary.

Selected Short Stories:

Three short stories from the book, "Added Value: The Life Stories of Indian Business Leaders." by Peter Church, Lotus Collection, New Delhi

1. Rahul Bajaj/ Bajaj Group (Page No. 20)
2. Subhash Chandra/ Essel Group/Zee TV (Page No. 40)
3. NR Narayana Murthy/Infosys (Page No. 148)

Preparation for Job:

Writing Applications for Jobs, Preparing Curriculum Vitae, Preparing for Interviews, Preparing for Group Discussions.

Text Books:

1. Organizations - Structures, Processes and Outcomes; Richard h Hall; Prentice Hall India.
2. English for the Secretary; Yvonne Hoban; Tata McGraw Hill.
3. Technical Communication: M. Raman & S. Sharma; Oxford University Press.

4. Business Communication Process and Product: M.E. Guffey; Thomson Learning.

Reference Book:

1. Human Behavior at Work; John W Newstorm & Keith Davis; Tata McGraw Hill.
2. The Most Common Mistakes in English Usage; Thomas Elliot Berry, Tata McGrawHill
3. Business Communication: R.K. Madhukar; Vikas Publication.

Course Outcome

CO1: To enhance the level of literary and aesthetic experience of students and to help them respond creatively.

CO2: To sensitize students to the major issues in the society and the world.

CO3: To provide the students with an ability to build and enrich their communication skills.

CO4: To equip students to utilize the digital knowledge resources effectively for their chosen fields of study

CO5: To help them think and write imaginatively and critically.

CO6: To broaden their outlook and sensibility and acquaint them with cultural diversity and divergence in perspectives.

CO7: Equip them with basic knowledge to pursue careers in publishing, cinema, theatre, journalism, education and advertising

BCA 101 –Communicative English																				
COs \ POs / PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1: To enhance the level of literary and aesthetic experience of students and to help them respond creatively.	3	2	3	3	2	2	2	2	2	2	3	2	2	2	1	2	2	3	3	3
CO2: To sensitize students to the major issues in the society and the world.	3	3	3	3	3	2	2	2	3	3	3	3	2	2	2	2	3	2	3	2
CO3: To provide the students with an ability to build and enrich their communication skills.	3	2	3	3	2	2	3	3	2	2	3	3	3	2	2	2	3	3	3	2
CO4: To equip students to utilize the digital knowledge resources effectively for their chosen fields of study	3	2	3	3	2	2	2	3	2	2	3	3	3	3	2	3	2	2	3	3
CO5: To help them think and write imaginatively and critically.	2	2	3	3	3	3	3	3	3	2	2	2	2	2	3	3	3	3	3	3
CO6: To broaden their outlook and sensibility and acquaint them with cultural diversity and divergence in perspectives.	3	2	3	3	2	2	3	3	2	2	3	3	3	2	2	2	3	3	3	2
CO7: Equip them with basic knowledge to pursue careers in publishing, cinema, theatre, journalism, education and advertising	3	2	3	3	2	2	3	3	2	2	3	3	3	2	2	2	3	3	3	2

BCA-102 BASIC MATHEMATICS

Syllabus

Matrices: Basic Definitions, matrix operations- addition, multiplication, transpose, Adjoint and inverse. Determination of a square matrix (up to 3X3 matrix)

Statements (Propositions), Logical Operations, Truth Table, Tautologies, Contradiction, Logical Equivalence, Algebra of Propositions, Conditional and bi-conditional Statement, Argument, Logical Implication, Propositional Functions, Quantifiers, Negation of Quantifiers Statements, Normal.

Integers: Properties of integers, order and inequalities, Absolute value, Mathematical Induction, Division Algorithm, Divisibility, Primes, Greatest Common Divisor(GCD),Euclidean Algorithm, Fundamental Theorem of Arithmetic, congruence Relation.

Sets: Introduction, Sets and their representations, empty set, Finite & infinite sets, equal sets, subsets, power sets, universal sets, complements of a set. Cartesian products of sets.

Relations: Types of relations, reflective, symmetric, transitive and equivalence relations. Functions: one to one and onto functions, composite functions, inverse of a function, Binary operations, recursively defined functions.

Text Books:

1. Mathematics Volume I By R.D. Sharma (DhanpatRai Publication)
2. Mathematics Volume II By R.D. Sharma (DhanpatRai Publication)
3. Discrete mathematics By Vinay Kumar (BPB)
4. Discrete mathematical Structure By Dr. K.C. Jain, Dr. M.L. Rawat.
5. Grewal B.S., Higher Engineering Mathematics, Delhi Khanna Publishers.

Reference Book:

1. Engineering Mathematics Volume I By S.S. sastry (Prentice-Hall of India)
2. Discrete mathematics Schaum's Series By Seymour LipSchutz, Marc Lipson (Tata McGraw Hill)

Course Outcome

CO1: Understand and be able to apply basic definitions and concepts in set and function theory.

CO2: Understand the definitions of limits and convergence in the context of sequences and series of real numbers.

CO3: Be able to compute limits of sequences involving elementary functions.

CO4: Classify partial differential equations and transform into canonical form.

CO5: Solve linear partial differential equations of both first and second order and apply partial derivative equation techniques to predict the behavior of certain phenomena.

BCA-102 BASIC MATHEMATICS																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1: Understand and be able to apply basic definitions and concepts in set and function theory.	3	2	2	2	2	1	2	2	3	2	3	2	2	2	1	2	2	2	3	2
CO2: Understand the definitions of limits and convergence in the context of sequences and series of real numbers.	2	3	2	2	1	2	2	3	2	2	2	3	3	2	1	2	2	2	2	2
CO3: Be able to compute limits of sequences involving elementary functions.	3	3	3	2	1	2	2	3	3	3	3	3	2	2	2	2	2	2	3	3
CO4: Classify partial differential equations and transform into canonical form.	3	3	2	2	1	2	3	2	2	2	3	2	3	2	2	3	2	2	3	2
CO5: Solve linear partial differential equations of both first and second order and apply partial derivative equation techniques to predict the behavior of certain phenomena.	3	3	2	3	2	2	2	3	3	2	3	3	3	3	2	2	2	3	2	3

BCA-103 INFORMATION TECHNOLOGY AND APPLICATION

Syllabus

Introduction to Computers

Introduction, Characteristics of computers, Evolution of computers, Generation of Computers, Classification of Computers, The Computer System, Applications of Computers.

Input / Output devices and Memory

Introduction, Keyboard, Pointing Devices, Speech Recognition, Digital Camera, Scanners, Optical Scanners. Classification of Output, Printers, Plotters, Computer Output Microfilm (COM), Monitors, Audio Output, Projectors. Random Access Memory (RAM), Types of RAM, Read Only Memory (ROM), Types of ROM. Classification of Secondary Storage Devices.

Software Concepts

Introduction to Software, Relationship between Software and Hardware, System Software, Application Software and its types, Utility Software, Algorithm, Flowchart, Program, and Pseudo code (P-Code).Features of a Good Programming Language.

Data Communication and Computer Network

Introduction, Data Communication, Transmission Media, Multiplexing, Switching, Computer Network, Network Topologies, Communication Protocols, Network devices.

World Wide Web, Hypertext, Uniform Resource Locator, Web Browsers, IP Address, Domain

Name, Internet Services Providers, Internet Security, Internet Requirements, Web Search Engine, Net Surfing, Internet Services, MS-Office – MS-Word, MS-Excel, Ms-Power Point.

Text Books:

1. V. Rajaraman, Fundamentals Of Computers, 3rd Edition , PHI Publications
2. Nasib S. Gill, Essentials of Computer & Network Technology, Khanna Publications.
3. Deepak Bharihoke, Fundamentals of Information Technology, Excel Books.

Reference Book:

1. Rajaraman V. – Fundamental of Computers, Prentice Hall of India Pvt. Ltd., New Delhi – 2nd edition, 1996.

Course Outcome

CO1: Design and develop software solutions for contemporary business environments by employing appropriate problem solving strategies.

CO2: Comprehend and resolve common desktop and network issues.

CO3: Analyze common business functions and identify, design, and develop appropriate information technology solutions (in web, desktop, network, and/or database applications.

CO4: Learn future technologies through acquired foundational skills and knowledge and employ them in new business environments.

CO5: Practice communication, problem solving and decision-making skills through the use of appropriate technology and with the understanding of the business environment.

BCA-103 INFORMATION TECHNOLOGY AND APPLICATION																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1: Design and develop software solutions for contemporary business environments by employing appropriate problem solving strategies.	3	2	3	2	2	2	2	2	2	2	3	2	2	3	1	2	2	2	3	2
CO2: Comprehend and resolve common desktop and network issues.	3	3	2	3	2	2	3	3	2	3	3	3	3	3	2	3	2	3	3	2
CO3: Analyze common business functions and identify, design, and develop appropriate information technology solutions (in web, desktop, network, and/or database applications.	3	3	3	3	3	3	3	2	2	2	3	3	2	3	2	2	3	3	3	2
CO4: Learn future technologies through acquired foundational skills and knowledge and employ them in new business environments.	3	3	2	2	1	2	3	2	3	2	3	2	2	2	2	2	3	2	3	2
CO5: Practice communication, problem solving and decision-making skills through the use of appropriate technology and with the understanding of the business environment.	3	3	2	3	2	2	3	3	2	3	3	3	3	3	2	3	2	3	3	2

BCA-104 PROGRAMMING IN C

Syllabus

Fundamentals of C: History of Programming language. Identifier and keywords - data types - constants - Variables - Declarations -Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions. Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, goto statements - Comma operator.

Functions -Definition - prototypes –types-Passing arguments–Recursion and its types-Storage Classes - Automatic, External, Static, Global and Register Variables.

Arrays - Defining and Processing - Passing arrays to functions - Multi-dimension arrays – Arrays and Strings.

Structures and unions - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.

Pointers - Declarations - Passing pointers to Functions - Operation on Pointers - Pointer and Arrays, Arrays of Pointers - Structures and Pointers.

Files: File Handling in C Using File Pointers, Open a file using the function fopen ( ), Close a fileusing the function fclose ( ), Input and Output using file pointers, Character Input and Output in Files, String Input / Output Functions, Formatted Input / Output Functions, Block Input / Output Functions, Sequential Vs Random Access Files, Positioning the File Pointer.

Text Book:

1. E. Balaguru Swamy - ANSI C Programming Language, 2nd Edition, PHI, 1988.
2. Kanetkar Y., Let us C, BPB Pub., New Delhi, 1999.
3. ReemaThareja - Programming in C

Reference Book:

1. H. Schildt, C: The Complete Reference, 4th Edition, TMH Edition, 2000.
2. Byron Gotlfried – C Programming; Oxford University Press

Course Outcome

CO1: Illustrate the flowchart and designing an algorithm for a given problem to develop c programs using operators.

CO2: Develop conditional and iterative statements to write c programs.

CO3: Exercise user defined functions to solve real time problems.

CO4: C programs that use pointers to access arrays, strings and functions.

CO5: Exercise user defined data types including structures and unions to solve problems.

CO6: Exercise files concept to show input and output of files in c.

CO7: Learns the basic computer language

CO8: To inculcate logical thinking amongst the young minds.

BCA-104 PROGRAMMING IN C																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1: Illustrate the flowchart and designing an algorithm for a given problem to develop c programs using operators.	3	3	2	2	2	2	2	2	2	2	3	3	2	2	2	2	2	2	3	2
CO2: Develop conditional and iterative statements to write c programs.	3	3	3	2	2	2	3	3	2	2	3	3	3	2	2	2	2	2	3	3
CO3: Exercise user defined functions to solve real time problems.	3	3	3	3	2	2	3	3	2	2	3	3	3	2	2	2	3	3	3	2
CO4: C programs that use pointers to access arrays, strings and functions.	3	3	3	3	2	2	3	3	3	3	3	3	3	2	2	3	3	2	3	2
CO5: Exercise user defined data types including structures and unions to solve problems.	3	3	3	3	3	2	3	3	2	3	3	3	2	3	3	3	3	3	3	3
CO6: Exercise files concept to show input and output of files in c.	3	3	3	3	3	3	3	2	2	2	3	3	2	3	2	2	3	3	3	2
CO7: Learns the basic computer language	3	2	3	2	2	2	2	2	2	2	3	2	2	3	1	2	2	2	3	2
CO8: To inculcate logical thinking amongst the young minds.	3	3	2	2	1	2	3	2	3	2	3	2	2	2	2	2	3	2	3	2

BCA-105 PRINCIPLE OF PROGRAMMING

Syllabus

Algorithm: Generalized Algorithms; Avoiding infinite loops in Algorithms-By Counting, by using sentinel value; Different ways of Representing an Algorithm-As a Program, As a Flowchart, As a Pseudo Code; Need for Planning a program before coding, Program Planning Tools- Flow Charts, Structure Charts, Pseudo codes

Programming Techniques: Top down, Bottom up, Modular, Structured, Features, Merits, Demerits and their Comparative study. Importance of use of indentation in programming; structured Programming concepts- Need of careful use of "GoTo Statement"; Sequence Logic, selection logic, logic and iteration Logic, functions

Programming Language: Types –Machine, Assembly and High –level Languages; Scripting and Natural Languages; Their relative advantages and Limitations; High Level Programming Language Tools- Compiler, Linker, Interpreter, Intermediate Language Compiler and Interpreter, Editor

Overview of some popular High Level Languages- FORTRAN, COBOL, BASIC, Pascal, C, C++, JAVA, LISP, PROLOG, PYTHON; Characteristics of a Good Programming Language; Selecting a Language out of many available languages for coding an Application; Subprograms.

Testing and Debugging: Difference; Types of Program errors ; Testing a Program; Debugging a program for Syntax Errors; Debugging a program Logic Errors; Concepts of APIs and Libraries. Program Documentation: Need for Documenting Programs and Software; Forms of Documentation-Comments, System Manual, User Manual; Documentation Standards and Notations

Reference Book:

1. Fundamentals of Programming languages by Ellis Holowits, Springer
2. Fundamentals of Programming languages by Tolani, Pearson
3. Programming Languages: Principles and paradigms by Maurizio Gabbrielli and Simone Martini, Springer

Course Outcome

CO1. Automate the performance of a task
CO2. To analyze impacts of computing on individuals, organizations, and society.
CO3. Learns the basic computer language
CO4. To inculcate logical thinking amongst the young minds.

BCA-105 PRINCIPLE OF PROGRAMMING																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**	
CO1. Automate the performance of a task	3	2	2	2	1	2	2	2	2	2	3	2	2	3	1	2	2	2	3	2	
CO2. To analyze impacts of computing on individuals, organizations, and society.	3	3	3	2	2	1	2	2	3	2	3	3	3	3	2	3	2	2	3	2	
CO3. Learns the basic computer language	3	3	2	2	1	2	2	2	3	2	3	3	3	2	2	2	3	2	2	3	
CO4. To inculcate logical thinking amongst the young minds.	3	3	2	2	1	2	2	3	2	3	2	3	2	3	2	2	3	3	2	3	

SEMESTER-II

SEMESTER - 2									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	IA	ESE	SUB-TOTAL		
BCA 201	Data Structure using C	4	0	0	30	70	100	4	4
BCA202	Computer Organization	4	1	0	30	70	100	5	5
BCA 203	Operating system	4	0	0	30	70	100	4	4
BCA 204	Introduction of Statistics	4	0	0	30	70	100	4	4
BCA205	System Analysis & Design	4	0	0	30	70	100	4	4
BCA 206	Data Structure using C LAB	0	0	4	30	70	100	2	4
BCA 207	Operating system LAB	0	0	4	30	70	100	2	4
							Total Credits:	25	

IA = Internal Assessment, **ESE** = End Semester Exam

BCA-201 DATA STRUCTURE USING C

Syllabus

Primitive and Composite Data Types, Time and Space Complexity of Algorithms, Stack and Primitive Operation on Stack. Applications- Infix, Postfix, Prefix and Recursion. Queues, Primitive Operations on Queues, Circular Queue, De Queue and Priority Queue.

Linked List: Basic Operation on Linked List, Circular Linked List, Doubly Linked List, Linked Representation of Stack and Queue, Application of Linked List.

Trees: Basic Terminology, Binary Trees, Tree Representation as Array and Linked List, Basic Operation on Binary Tree, Traversal of Binary Tree – In Order, Preorder, Post Order, Application of Binary Tree, Threaded Binary Tree, B-Tree and Height Balance Tree(AVL).

Sorting & Searching: Sequential Search, Binary Search, Insertion Sort, Selection Sort, Quick Sort, Bubble Sort, Heap Sort, and Comparison of Sorting Methods.

Graph: Introduction to Graphs, Definition, Terminology, Directed, Undirected, Weighted Graph, Representation of Graphs, Graph Traversal – Depth First and Breadth First, Spanning Trees, Minimum Spanning Trees, Shortest Path Algorithm.

Text Book:

1. Expert Data Structure with 'C' By R.B Patel (Khanna Book Publishing Co.(P))
2. Data structure By Lipschutz (Tata McGraw Hill)
3. Data Structure By YashvantKanitkar (BPB)

Reference Book:

1. An Introduction to Data Structures with Applications, By Jean-Paul Tremblay, Paul G.Sarerson (Tata McGraw Hill)
2. Data Structure Using C and C++ By Yedidyahlangsam, Moshe J.Augenstein, Arora M. Tenenbaum (Prentice- Hall India)

Course Outcome

CO1. Understand the classification of data structures and Knowledge of basic and dynamic data structures.

CO2. Compare and contrast various data structures and design techniques in the area of Performance and Memory Representation.

CO3. Ability to evaluate algorithms and data structures in terms of time and complexity of basic operations.

CO4. Ability to analyze algorithms for stack, queue and linked list, trees, and graphs and compare their Performance and tradeoffs.

CO5. Incorporate data structures into the applications such as binary search trees, AVL tree and B trees.

CO6. Ability to implement Data Structure Traversal such as Array, Stack, Queue, Linked List, Tree and Graph.

CO7. Apply and implement learned algorithm design techniques and data structures to solve problems.

CO8. Understand the various searching and sorting techniques.

BCA-201 DATA STRUCTURE USING C																				
COs \ POs / PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1. Understand the classification of data structures and Knowledge of basic and dynamic data structures.	2	2	2	2	3	2	2	3	2	2	3	2	2	2	2	2	3	2	2	2
CO2. Compare and contrast various data structures and design techniques in the area of Performance and Memory Representation.	2	3	3	2	3	3	2	3	2	3	3	3	2	2	2	3	3	3	3	3
CO3. Ability to evaluate algorithms and data structures in terms of time and complexity of basic operations.	3	3	2	2	3	2	3	3	3	3	3	2	3	3	3	2	3	2	3	3
CO4. Ability to analyze algorithms for stack, queue and linked list, trees, and graphs and compare their Performance and tradeoffs.	3	2	3	2	3	3	2	3	3	2	3	3	3	2	3	3	3	2	2	3
CO5. Incorporate data structures into the applications such as binary search trees, AVL tree and B trees.	3	3	3	3	3	3	3	2	2	2	3	3	2	3	2	2	3	3	3	2

CO6. Ability to implement Data Structure Traversal such as Array, Stack, Queue, Linked List, Tree and Graph.	3	2	3	2	2	2	2	2	2	2	3	2	2	3	1	2	2	2	3	2
CO7. Apply and implement learned algorithm design techniques and data structures to solve problems.	3	3	2	2	1	2	3	2	3	2	3	2	2	2	2	2	3	2	3	2
CO8. Understand the various searching and sorting techniques.	3	3	2	2	1	2	2	2	3	2	3	3	3	2	2	2	3	2	2	3

BCA-202 COMPUTER ORGANIZATION

Syllabus

Components of a Computer: Processor, Memory, Input-Output Unit, Difference between Organization and Architecture, Hardware Software Interaction. **Number System:** Concept of Bit and Byte, types and conversion. **Complements:** 1's complement, 2's complement. **Binary Arithmetic:** Addition, overflow, subtraction.

Logic gates: Boolean Algebra, Map Simplification. **Combinational circuits**: Half Adder, Full Adder, Decoders, Multiplexers. **Sequential circuits:** Flip Flops- SR, JK, D, T Flip-Flop.

Input Output Organization: Peripheral devices, I/O Interface, Asynchronous Data Transfer, Modes of Data Transfer, Direct Memory Access, I/O Processor.

Memory Organization: Types and capacity of Memory, Memory Hierarchy, Cache Memory, Virtual Memory.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Mode, Data Transfer and Manipulation, Program Control.

Text Book:

1. Computer System Architecture, By M. Morris Mano (Pearson, Prentice Hall)
2. Carter Nicholas, "Computer Architecture", Schaun outline Sevies , Tata McGraw-Hill.

Reference Book:

1. J.P. Hayes, "Computer Architecture & Organization", Tata McGraw Hill
2. Digital Computer Electronics By Malvino Leach, Jerald A. Brown(McGraw Hill)

Course Outcome

CO1. Became familiar with the digital signal, positive and negative logic, Boolean algebra, logic gates, logical variables, the truth table, number systems, codes, and their conversion from to others.

CO2. Learn the minimization techniques to simply the hardware requirements of digital circuits, implement it, design and apply for real time digital systems.

CO3. Understand the working mechanism and design guidelines of different combinational, sequential circuits and their role in the digital system design.

CO4. Became able to know various types of components-ADC and DAC, memory elements and the timing circuits to generate different waveforms, and also the different logic families involved in the digital system.

BCA-202 COMPUTER ORGANIZATION																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Became familiar with the digital signal, positive and negative logic, Boolean algebra, logic gates, logical variables, the truth table, number systems, codes, and their conversion from to others.	3	2	2	2	3	2	2	2	2	2	3	2	2	2	2	2	3	2	2	3
CO2. Learn the minimization techniques to simply the hardware requirements of digital circuits, implement it, design and apply for real time digital systems.	3	3	2	3	3	2	2	3	2	3	3	3	3	3	2	3	3	2	3	3
CO3. Understand the working mechanism and design guidelines of different combinational, sequential circuits and their role in the digital system design.	3	3	2	2	3	3	2	3	3	3	3	2	3	3	2	2	3	2	3	3
CO4. Became able to know various types of components-ADC and DAC, memory elements and the timing circuits to generate different waveforms, and also the different logic families involved in the digital system.	3	3	3	2	3	2	3	3	3	3	3	3	3	2	2	3	3	2	3	3

BCA-203 OPERATING SYSTEM

Syllabus

Introduction to Operating System, layered Structure, Functions, Types; Process: Concept, Process States, PCB; Threads, System calls; Process Scheduling: types of schedulers, context switch.

CPU Scheduling, Pre-Emptive Scheduling, Scheduling Criteria- CPU Utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling Algorithms- FCFS, SJF, Priority Scheduling, Round Robin Scheduling, MLQ Scheduling.

Synchronization: Critical Section Problem, Requirements for a solution to the critical section problem; Semaphores. Deadlock: Characterization, Prevention, Avoidance, Banker's Algorithm, Recovery from Deadlock.

Memory Management: Physical and virtual address space, Paging, Overview of Segmentation; Virtual Memory Management: Concept, Page Replacement technique FIFO.
Linux: features of Linux, steps of Installation, Shell and kernel, Directory structure.

Linux: Users and groups, file permissions, commands- ls, cat, cd, pwd, chmod, mkdir, rm, rmdir, mv, cp, man, apt, cal, uname, history etc. ; Installing packages; Shell scripts: writing and executing a shell script, shell variables, read and expr, decision making (if else), for and while loops.

Text Book:

1. Operating System Concepts And Design By Milan MilenKovic (Tata Mcgraw Hill)
2. Modern Operating System Andrew S. Tanenbaum, Herbert Bos
3. Linux in easy steps, Mike McGrath, in easy steps limited

Reference Book:

1. Modern Operating System Andrew S. Tanenbaum, Herbert Bos
2. Operating System Principals By Abraham Silberschatz, Peter Baer Galvin (John Wiley And Sons Inc.)
3. Unix concepts and apllications , TMH, Sumitabha Das

Course Outcome

CO1. To understand the basic concepts and working procedure of various Operating Systems.

CO2. Understand the basics of operating systems like kernel, shell, types and views of Operating systems.

CO3. Describe the various CPU scheduling algorithms and remove deadlocks.

CO4. To use the computer system resources in an efficient way.

CO5. Explain various memory management techniques and concept of thrashing

CO6. Use disk management and disk scheduling algorithms for better utilization of external memory.

CO7. To facilitate with effective development and implementation of new system functions.

BCA-203 OPERATING SYSTEM																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. To understand the basic concepts and working procedure of various Operating Systems.	3	3	2	2	3	2	2	2	2	2	3	3	2	3	2	3	2	2	2	3
CO2. Understand the basics of operating systems like kernel, shell, types and views of Operating systems.	3	3	3	2	3	2	2	2	2	3	3	3	3	3	2	3	2	2	2	3
CO3. Describe the various CPU scheduling algorithms and remove deadlocks.	3	3	2	3	3	2	3	2	2	3	3	3	3	2	2	3	3	2	3	3
CO4. To use the computer system resources in an efficient way.	3	3	2	3	3	2	3	3	3	3	3	3	3	3	2	3	3	3	3	3
CO5. Explain various memory management techniques and concept of thrashing	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO6. Use disk management and disk scheduling algorithms for better utilization of external memory.	3	3	2	2	3	2	2	2	2	2	3	3	2	3	2	3	2	2	2	3
CO7. To facilitate with effective development and implementation of new system functions.	3	3	3	2	3	2	2	2	2	3	3	3	3	3	2	3	2	2	2	3

BCA-204 INTRODUCTION OF STATISTICS

Syllabus

COMBINATORICS: Permutation and Combination, Repetition and Constrained Repetition, Binomial Coefficients, Binomial Theorem.

Frequency distributions, Histograms and frequency polygons, Measures of central tendency: Mean Mode, Median, Dispersion, Mean deviation and standard deviation. Moments, Skewness, kurtosis,

Elementary probability Theory: Definition, conditional probability, Probability distribution, mathematical expectation'

Theoretical Distribution: Binomial, Poisson and Normal distribution, Relation between the binomial, poisoned Normal distribution.

Correlation and Regression: Linear Correlation, Measure of Correlation, Least Square Regression lines.
Curve fitting: Method of least square, least square line, least squares Parabola. Chi-square test: Definition of chi-square; signification test: contingency test, coefficient of contingency.

Basic of sampling theory: Sample mean and variance, students t-test, test of Hypotheses and significance, degree of freedom, Z-test, small and large sampling, Introduction to Monte Carlo method.

Text Book:

1. Numerical Analysis: S.S. Sastry; Prentice Hall of India, 1998.
2. Mathematical Statistics: J.N. Kapoor and H.C. Saxena.
3. Mathematical Statistics: M. Ray and H. Sharma

Reference Book:

1. Advanced Engineering Mathematics: H.K. Dass; S. Chand & Co., 9 Revised Edition, 2001.
2. Discrete Mathematics: S.K. Sarkar; S. Chand & Co., 2000.

Course Outcome

CO1. Concepts of statistical population and sample, variables and attributes.
CO2. Tabular and graphical representation of data based on variables.
CO3. Conditions for the consistency' and criteria for the independence of data based on attributes

BCA-204 INTRODUCTION OF STATISTICS																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Concepts of statistical population and sample, variables and attributes.	3	2	2	2	3	2	3	2	3	2	3	3	2	2	3	2	3	2	3	3
CO2. Tabular and graphical representation of data based on variables.	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	3	3	3	3	3
CO3. Conditions for the consistency' and criteria for the independence of data based on attributes	3	3	2	3	3	2	3	3	3	3	3	3	3	3	2	3	3	3	3	3

BCA-205 SYSTEM ANALYSIS AND DESIGN

Syllabus

Introduction of SAD: Fundamentals of System, Important Terms related to Systems, Classification of Systems, Real Life Business Subsystems, Real Time Systems, Distributed Systems, Development of a successful System, and Various Approaches for development of Information Systems. Structured Analysis and Design Approach, Prototype, Joint Application Development.

Systems Analyst-A Profession: Why do Businesses need Systems Analysts? Users, Analysts in various functional areas, Role of a Systems Analyst Duties of a Systems Analyst, Qualifications of a Systems Analyst, Analytical Skills, Technical Skills, Management Skills, Interpersonal Skills.

Process of System Development: Systems Development Life Cycle, Phases of SDLC, Project Identification and Selection, Project Initiation and planning, Analysis, Logical Design, Physical Design, Implementation, Maintenance, Product of SDLC Phases, Approaches to Development, Prototyping, Joint Application Design, Participatory Design.

Introduction to Documentation of Systems: Concepts and process of Documentation, Types of Documentation, System Requirements Specification, System Design Specification, Test Design Document, User Manual, Different Standard for Documentation, Documentation and Quality of Software, Good Practices for Documentation.

Process of System Planning: Fact finding Techniques, Interviews, Group Discussion, Site Visits, Presentations, Questionnaires, Issues involved in Feasibility Study, Technical Feasibility, Operational Feasibility, Economic Feasibility, Legal Feasibility, Cost Benefit Analysis, Preparing Schedule, Gathering Requirements of System, Joint Application Development, Prototyping.

Modular and Structured Design: Design Principles, Top down Design, Bottom Up Design, Structure Charts, Modularity, Goals of Design, Coupling, Cohesion.

System Design and Modeling: Logical and Physical Design, Process Modeling, Data Flow Diagrams, Data Modeling, E-R Diagrams, Process Specification Tools, Decision Tables, Decision Trees, Notation Structured English, Data Dictionary.

Forms and Reports Design: Forms, Importance of Forms, Reports, Importance of Reports, Differences between Forms and Reports, Process of Designing Forms and Reports, Deliverables and Outcomes, Design Specifications, Narrative Overviews, Sample Design, Testing and Usability Assessment, Types of Information, Internal Information, External Information.

Audit and Security of Computer Systems: Introduction, Definition of Audit, Objectives of Audit.

Text Book:

1. Elias M. Award: System Analysis and design Galgotia
2. James A. Sen: Analysis of Design of Information System TMH
3. Rojer S. Pressman: Software Engineering : A Practitioners Approach, MCH
4. Pankaj Jalote: An Integrated Approach to Software Engineering; Springer.

Reference Book :

1. J. L. Whitten & L. D. Bentley : System Analysis and Design Method; TMH
2. J. B. Dixit &Rajkumar : Structured system Analysis and Design; University Science Press
3. K.C. Landon & J. P.Landon : MIS ; Macmilla

Course outcome

CO1. Conducts research on existing systems.
CO2. Develop plans for the new system.
CO3. Explore the technical risks involved in the system's and technical possibilities.
CO4. Scheduling with using GANTT and PERT techniques.
CO5. Evaluates the economic self-sufficiency whether to install the system.
CO6. Identifies problems in the system.
CO7. Determine the cause of the problem in the system.
CO8. Find a solution of the problem in the system.

BCA-205 SYSTEM ANALYSIS AND DESIGN																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Conducts research on existing systems.	3	3	2	2	3	2	3	2	3	2	3	3	3	2	3	2	3	2	3	3
CO2. Develop plans for the new system.	3	3	2	3	3	2	3	3	3	2	3	3	3	3	3	2	3	2	3	3
CO3. Explore the technical risks involved in the system's and technical possibilities.	3	3	3	2	3	2	3	2	3	3	3	3	3	3	3	2	3	2	3	2
CO4. Scheduling with using GANTT and PERT techniques.	3	3	3	3	3	2	3	2	3	2	3	3	3	3	3	2	3	3	3	3
CO5. Evaluates the economic self-sufficiency whether to install the system.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO6. Identifies problems in the system.	3	2	2	3	3	2	3	3	2	2	3	3	3	3	3	2	3	2	3	2
CO7. Determine the cause of the problem in the system.	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO8. Find a solution of the problem in the system.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

SEMESTER-III

SEMESTER - 3									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	IA	ESE	SUB-TOTAL		
BCA 301	**Software Engineering**	4	1	0	30	70	100	5	5
BCA 302	**Object Oriented Programming with C++**	4	0	0	30	70	100	4	4
BCA 303	**Database Management System**	4	0	0	30	70	100	4	4
BCA 304	**Computer Networking**	4	0	0	30	70	100	4	4
BCA 305	**Principle of Management**	4	0	0	30	70	100	4	4
BCA 306	**Object Oriented Programming with C++ LAB**	0	0	4	30	70	100	2	4
BCA 307	**Database Management System LAB**	0	0	4	30	70	100	2	4
							Total credit:	**25**	

IA = Internal Assessment, **ESE** = End Semester Exam

BCA-301 SOFTWARE ENGINEERING

Syllabus

Introduction to Software Engineering: Characteristics, Emergence of Software Engineering, Software Metrics & Models, Process & Product Metrics. Software Life Cycle Models: Waterfall, Prototype and Spiral Models and their Comparison.

Software Project Management: Size Estimation- LOC and FP Metrics, Cost Estimation- Delphi and Basic COCOMO, Introduction to Halstead's Software Science, Staffing Level Estimation-Putnam's Model. Software Requirements Specification: SRS Documents, their Characteristics and Organization.

Software Design: Classification, Software Design Approaches, Function Oriented Software Design, Structured Analysis- Data flow Diagrams and Structured Design, Introduction to Object Oriented Design.

Coding and Testing of Software: Unit Testing, Block Box Testing, White Box Testing, Debugging, Program Analysis Tools, System Testing. Software Reliability and Quality Assurance: Reliability Metric- Musa's Basic Model.

Software Quality Assurance: ISO 9000 and SEI CMM and their Comparison. Software Maintenance: Maintenance Process Models and Reverse Engineering, Estimation of Maintenance Costs.

Text Book:

1. Rajib Mall -Fundamentals of Software Engineering, Prentice Hall of India, New Delhi, 2005.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, New Delhi, 2005

Reference Book:

1. Richard Fairley- Software Engineering Concepts, Tata McGraw Hill, New Delhi, 2006.
2. Roger S Pressman – Software Engineering; T.M.H

Course Outcome

CO1. Design and implement Test Plans and Procedures

a. Students can design comprehensive test plans
b. Students can create test procedures
c. Students can evaluate the results of tests

d. Students can assess a software process to evaluate how effective it is at promoting quality

CO2. Apply a wide variety of testing techniques at various testing levels

a. Students differentiate the purposes and applicable techniques among the various levels of testing: unit, integration, system, acceptance, usability, and regression testing
b. Students can conduct effective and efficient inspections
c. Students can explain and apply graph coverage criteria for structural coverage
d. Students can explain and apply data flow coverage and logic coverage
e. Students can explain and apply input space partitioning
f. Students can explain and apply mutation testing

CO3. Use test tools to effectively test software

a. Students can use unit

CO4. Compute and use various testing metrics

a. Students can compute test coverage and yield, according to a variety of criteria
b. Students can use statistical techniques to evaluate the defect density and the likelihood of fault

BCA-301 SOFTWARE ENGINEERING																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Design and implement Test Plans and Procedures	3	2	3	3	2	2	2	3	3	2	3	2	2	3	2	3	2	3	3	3
CO2. Apply a wide variety of testing techniques at various testing levels	3	3	2	3	2	2	2	3	3	2	3	3	2	3	2	3	2	3	3	3
CO3. Use test tools to effectively test software	2	2	2	2	3	2	2	3	2	3	3	2	2	3	2	3	3	3	2	3
CO4. Compute and use various testing metrics	3	3	3	3	3	3	2	3	3	3	3	2	2	2	3	3	3	3	3	3

BCA-302 OBJECT ORIENTED PROGRAMMING USING C++

Syllabus

Object Oriented System: Difference Between Procedural and Object Oriented Languages, Object Oriented Paradigm, Inheritance, Polymorphism, Abstraction, Encapsulation, Benefits and Application of Oops. Introduction to C++: Character Set, Token, Constants, Variables and Data Types, Enumeration Types, Operators, Expressions, Operator Precedence and Associatively, Input, Output, Conditional Statements, Scope of Variables, Type Conversion.

Iteration, Break, Continue, goto, Pointers: Introduction, implementation advantage and disadvantage. Functions - Standard and User-Defined Function, Recursive Function, Passing By Value And Reference, Function Overloading Pointer and Function: Function Returning Pointer, Passing pointer as argument, Reference and Functions. Structures and Pointers.

Array: introduction, advantage, One, Two and Multidimensional, Passing Array to a Function,

Array and Pointers: Pointer to One and Two Dimensional Arrays, Array of Pointers. Dynamic Arrays, String Processing. Class: Introduction to Class and Object, Declaring Members and Methods in a class, declaring objects.

Functions and objects, Inline Function, Friend Functions and Its Usage, Abstract Class, Function Overriding. Constructor and Destructor- Needs and Its Usage, Types of Constructors, Destructor, Static Data Members and Methods. Inheritance - Need of Inheritance, Types of Inheritance and its implementation.

Operator Overloading: Need and Rules of Operator Overloading, Overloading Through Member Function and Friend Function. Compile Time and Run Time Polymorphism- Virtual Function and virtual class.

Text Book:

1. **E. Balagursamy :** Object oriented programming with C++; TMH Publication.
2. **Deitel and Deitel :** C++ How To Program (currently in its 4th edition); PHI.

Reference Book:

1. Robert Lafore : Object oriented programming in Turbo C++; Galgotia Publication
2. Object Oriented Programming With C++ By E. Balagurusamy (Tata Mcgraw Hill)

Course Outcome

CO1. To understand a software development problem and express it precisely.

CO2. To identify the objects of a system and to establish their relationships.

CO3. To implement a module structure this executes efficiently.

CO4. Able to generate a design which can be converted into applications with languages

BCA-302 OBJECT ORIENTED PROGRAMMING USING C++																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. To understand a software development problem and express it precisely.	3	3	2	2	3	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3
CO2. To identify the objects of a system and to establish their relationships.	3	3	2	3	3	2	3	3	3	3	3	3	3	2	3	3	3	3	3	3
CO3. To implement a module structure this executes efficiently.	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO4. Able to generate a design which can be converted into applications with languages	2	2	2	2	3	2	2	3	2	3	3	2	2	3	2	3	3	3	2	3

BCA-303 DATABASE MANAGEMENT SYSTEM

Syllabus

Introduction: Characteristics of database approach, Advantages, Database system architecture, Overview of different types of Data Models and data independence, Schemas and instances, Database languages and interfaces; E-R Model : Entities, Attributes, keys, Relationships, Roles, Dependencies, E-R Diagram.

Introduction to Relational model, Constraints: Domain, Key, Entity integrity, Referential integrity; Keys: Primary, Super, Candidate, Foreign; Relational algebra: select, project, union, intersection, cross product, different types of join operations.

SQL: Data Types, statements: select, insert, update, delete, create, alter, drop; views, SQL algebraic operations; Stored procedures: Advantages, Variables, creating and calling procedures, if and case statements, loops, Functions, Triggers.

Normalization: Definition, Functional dependencies and inference rules, 1NF, 2NF, and 3NF; Transactions processing: Definition, desirable properties of transactions, serial and non-serial schedules, concept of serializability, conflict-serializable schedules.

Concurrency Control: Two-phase locking techniques, dealing with Deadlock and starvation, deadlock prevention protocols, basic timestamp ordering algorithm; Overview of database recovery techniques; concept of data warehousing.

Text Book:

1. Database System Concepts By Korth, Silberschatz, Sudarshan (Mcgraw Hill)
2. An Introduction to Database Systems ByBipin C. Desai (Galgotia Publication.)
3. SQL, PL/SQL Programming By Ivan Bayross (BPB)
4. Commercial Application Development Using Oracle Developer 2000 By Ivan Bayross (BPB)

Reference Book:

1. Fundamentals of Database Systems, Ramez A. Elmasri, Shamkant Navathe,5th Ed(Pearson)

Course Outcome

CO1. Have a broad understanding of database concepts and database management system software including a high-level understanding of major DBMS components and their functions.

CO2. Able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model so as to successfully design a complete application.

CO3. Understand Data Normalization and its usage in database design so as to successfully design a complete application

CO4. Learn transaction properties and types in a DBMS including concurrency control and recovery.

CO5. Able to write SQL statements to create tables and indexes, set constraints, insert/update/delete data, and query data in a relational DBMS thereby building a successful application.

BCA-303 DATABASE MANAGEMENT SYSTEM																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Have a broad understanding of database concepts and database management system software including a high-level understanding of major DBMS components and their functions.	3	3	2	3	3	3	3	3	3	2	3	2	3	3	2	3	3	3	3	3
CO2. Able to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model so as to successfully design a complete application.	3	3	2	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO3. Understand Data Normalization and its usage in database design so as to successfully design a complete application	3	3	3	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO4. Learn transaction properties and types in a DBMS including concurrency control and recovery.	3	3	3	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO5. Able to write SQL statements to create tables and indexes, set constraints, insert/update/delete data, and query data in a relational DBMS thereby building a successful application.	3	3	3	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	3

BCA-304 COMPUTER NETWORKING

Syllabus

Data Communication and Networking: Overview, Network Types, LAN Technologies, Topologies, Models- OSI Model, TCP/IP Stack

Physical Layer: Introduction, Digital Transmission, modes, digital to digital, analog to digital ,Analog Transmission, digital to analog, analog to analog, Transmission media, Wireless Transmission, **Switching techniques:** Circuit Switching, Packet switching, Message switching. **Data Link Layer:** Introduction, Data Link Control: Line Discipline- Enq/Ack, Poll/Select, **Flow Control:** Stop And Wait, Sliding Window, **Error Control:**ARQ, Stop and Wait ARQ, Sliding Window ARQ.

Network Layer: Introduction, Network Addressing, Routing, Internetworking, Tunneling, Packet Fragmentation, Network Layer Protocols, ARP, ICMP, IPv4, IPv6

Transport Layer: Introduction, Transmission Control Protocol, User Datagram Protocol

Application Layer: Introduction, Client-Server Model, Application Protocols

Text Book:

1. Computer Forensics by Marie- Helen Maras
2. Data Communication and Networking By Forozan (Tata McGraw Hill)
3. Data Communication And Computer Networks By Dr. Madhulika Jain, Satish Jain (BPB)
4. Data Communication and Computer Networks", Vikas Publishing house Ltd. , 2005.

Reference Book:

1. A. S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.
2. A. Leon-Gracia and I. Widjaja, "Communication Networks", Tata McGraw Hill, 2004.
3. William Stallings, "Data and Computer Communications", Pearson Education, 2008.

Course Outcome

CO1. Describe communication models TCP/IP, ISO-OSI model, network topologies along with communicating devices and connecting media.

CO2. Apply knowledge of error detection, correction and learn concepts of flow control along with error control.

CO3. Classify various IP addressing techniques, subnetting along with network routing protocols and algorithms.

CO4. Understand various transport layer protocols and their design considerations along with congestion control to maintain Quality of Service.

BCA-304 COMPUTER NETWORKING																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Describe communication models TCP/IP, ISO-OSI model, network topologies along with communicating devices and connecting media.	3	3	3	2	2	3	3	2	3	2	3	3	3	2	3	2	3	3	3	2
CO2. Apply knowledge of error detection, correction and learn concepts of flow control along with error control.	3	3	3	2	2	3	3	2	3	2	3	3	3	3	3	2	3	3	3	2
CO3. Classify various IP addressing techniques, subnetting along with network routing protocols and algorithms.	3	3	3	3	2	3	3	2	3	2	3	3	3	3	3	2	3	3	3	2
CO4. Understand various transport layer protocols and their design considerations along with congestion control to maintain Quality of Service.	3	3	3	3	3	3	3	2	3	2	3	3	3	3	3	2	3	3	3	3

BCA-305 PRINCIPLE OF MANAGEMENT

Syllabus

Concept of Management: Definition, Nature, and scope, and overall view of Management, Relation with other social sciences and industry.

Evolution of Management thought:

(A) Classical Theory of Management.
(A1) Bureaucracy- Introduced by Max Weber.

(A2) Scientific Management - F.W. Taylor and his followers.
(A3) Process Management - H. Fayol and others.
(B) Neoclassical Theory of Management.
(B1) Human Relations - B.E. Mayo and Roethlisberger
(B2) Behavioral Science approach - By D. McGregor, A. Maslow & others.
(C) Modern Management theories: Peter Drucker.

Management Functions: Planning, Organizing, Staffing, Directing, and Controlling.

Executive Functions: Production, Marketing, Finance, Personnel.

Planning: Concept, Nature, Importance, Objectives, Policies, Procedure, Strategies and Method of Decision Making

Organization: Definition, Theories of Organization, Forms of organization, Formal and Informal Organization, Types of Formal Organizations, Departmentation, Line and Staff Relationship, Span of Management, Authority, Responsibility, Delegation, Centralization, Decentralization, Committees.

Staffing: Selection, Recruitment, Training, Development and Welfare

Directing: Leadership and Supervision, Motivation and Communication

Controlling: The Elements, Process and style of Control, Techniques of control. Social Responsibility of business

Text Books:

1. Koontz and O'Donnel - Principles of Management, Essentials of Management.

2. Theo Haiman - Management Theory and Practice.

Reference Books:

1. P.F. Drucker - Management - Task and Responsibility
2. P.F. Drucker - The Practice of Management
3. S. N. Banerjee - Principles of Management

Course outcome

CO1. It aims at grooming budding business professionals into true management leaders by imparting quality education, training them to challenge the convention and think innovatively.

CO2. Emanate Leadership, Creativity, Attitude, Skills, Passions and Learning from its every corner to cast its rays towards empowering business excellence in the Industry and academia.

CO3. Understand the application of theoretical studies into the real time application

CO4. Based approaches through Case based study, Internship and on-job training method. Understand on the problem-solving and strategic planning ability, enhancing the

CO5. Analytical skills and the ability to cope with demands and challenges. Assist students to pursue further higher studies and research based studies.

BCA-305 PRINCIPLE OF MANAGEMENT																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. It aims at grooming budding business professionals into true management leaders by imparting quality education, training them to challenge the convention and think innovatively.	3	3	2	2	1	2	3	1	2	2	3	3	3	2	2	2	3	1	2	2
CO2. Emanate Leadership, Creativity, Attitude, Skills, Passions and Learning from its every corner to cast its rays towards empowering business excellence in the Industry and academia.	3	3	2	2	1	2	3	2	3	2	3	3	3	2	3	2	3	2	3	2
CO3. Understand the application of theoretical studies into the real time application	3	3	2	2	1	3	3	2	3	3	3	3	3	3	3	2	3	3	3	2
CO4. Based approaches through Case based study, Internship and on-job training method. Understand on the problem-solving and strategic planning ability, enhancing the	3	3	2	3	1	3	3	2	3	3	3	3	3	3	3	2	3	3	3	2
CO5. Analytical skills and the ability to cope with demands and challenges. Assist students to pursue further higher studies and research based studies.	3	3	2	3	1	3	3	2	3	3	3	3	3	3	3	2	3	3	3	2

SEMESTER-IV

SEMESTER - 4									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	IA	ESE	SUB-TOTAL		
BCA 401	**Java Programming**	4	1	0	30	70	100	5	4
BCA 402	**Discrete mathematics**	4	1	0	30	70	100	5	4
BCA 403	**Environmental Science**	4	1	0	30	70	100	5	5
BCA 404	**Artificial Intelligence**	4	1	0	30	70	100	5	5
BCA 405	**Internet & Web Design**	4	0	0	30	70	100	4	4
BCA 406	**Java Programming LAB**	0	0	4	30	70	100	2	4
BCA 407	**Internet & Web Design LAB**	0	0	4	30	70	100	2	4
							Total Credit:	**28**	

IA = Internal Assessment, **ESE** = End Semester Exam

BCA-401 JAVA PROGRAMMING

Syllabus

Introduction to java: evolution, features, comparison with C and C++; Java program structure; tokens, keywords, constants, variables, data types, type casting, statements, Operators and Expression; Conditional Statements and Loop Statements.

Class: syntax, instance variable, class variables, methods, constructors, overloading of constructors and methods. Arrays, Strings and Vectors.

Inheritance: types of inheritance, use of super, method overriding, final class, abstract class, wrapper classes. Interface, Packages and visibility controls.

Errors and Exceptions: Types of errors, Exception classes, Exception handling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments. **Multithreaded Programming:** Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication, implementing the Runnable Interface;

Applet: Applet Life Cycle, Applet Tag, Adding Applet to HTML File; Passing Parameters to Applets, Getting Input From User. **AWT :** AWT Classes, Working With Frame Windows, Working With Graphics, Working With Color, Adding And Removing Controls, Responding To Controls, Labels, Buttons, Checkbox, Checkbox Group, Choice Control, Lists, Text Field, Text Area. Menus, Dialog Box, Handling Events.

Text Book:

1. Java: A Beginner's Guide, Sixth Edition: A Beginner's Guide by Herbert Schildt, McGraw-Hill Osborne Media
2. Programming in JAVA By E. Balagurusamy (TMH)
3. JAVA 2 programming Black Book By Steven Holzner et al. (Dreamtech Press)

Reference Book:

1. The Complete reference Java Ninth Edition By Herbert Schildt (Tata McGraw Hill)
2. Core Java Volume I--Fundamentals (9th Edition) by Cay S. Horstmann, Gary Cornell, Prentice Hall

Course Outcome

CO1. Understand & analyze the Java features and Program Structure.
CO2. Apply the concepts of encapsulation in classes and objects.
CO3. Classify and implement the types of Inheritance & Packages.
CO4. Differentiate and demonstrate the types in Thread creation and Exception Handling.
CO5. Create the Applet Program and apply the Collection Framework.

BCA-401 JAVA PROGRAMMING																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Understand & analyze the Java features and Program Structure.	3	3	2	2	1	2	3	2	3	3	3	3	3	2	3	2	3	1	3	3
CO2. Apply the concepts of encapsulation in classes and objects.	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	2	3	1	3	3
CO3. Classify and implement the types of Inheritance & Packages.	3	3	2	2	1	2	3	2	3	2	3	3	3	2	3	2	3	2	3	2
CO4. Differentiate and demonstrate the types in Thread creation and Exception Handling.	3	3	3	3	2	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3
CO5. Create the Applet Program and apply the Collection Framework.	3	3	2	2	1	2	3	2	3	2	3	3	3	2	3	2	3	2	3	2

BCA-402 DISCRETE MATHEMATICS

Syllabus

Fundamental- Sets and Subsets, Operations on Sets, Sequences, Properties of Integers, Matrices. **Logic-** Proposition and Logical Operations, Conditional Statements, Methods of Proof, Mathematical Induction.

Mathematical Logic-Statements and Notation, Connectives, Normal Forms, The Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

Counting- Permutations, Combinations, The Pigeonhole Principle, Recurrences Relations. **Relations and Digraphs-** Product Sets and Partitions, Relations and Digraphs, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations, Manipulation of Relations, Transitive Closure and Wars Hall's Algorithm.

Functions- Definition and Introduction Function for Computer Science, Permutation Functions.

Graph Theory- Basic Concept of Graph Theory, Euler Paths and Circuits, Hamiltonian Paths and Circuits.

Other Relations and Structure- Partially Ordered Sets, Lattices, Finite Boolean Algebras, Functions of Boolean Algebras, Boolean Functions As Boolean Polynomials. **Trees-** Introduction, Undirected Trees, Minimal Spanning Trees.

Semi Group and Groups- Binary Operations Revisited Semi Groups, Products and Quotients of Semi Groups, Groups, Products and Quotients of Groups.

Text Books:

1. J.P. Tremblay and R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science", TMH, ISBN- 0-07-463113-6
2. Bernard Kolman, Robert C. Busby and Sharon Ross, "Discrete Mathematical Structure", PHI,ISBN- 978-81-203-3689-6

References:

1. E. Goodaire , "Discrete Mathematics with Graph theory", PHI,. ISBN--10: 0131679953
2. J. K. Sharma, "Discrete Mathematics", McMillan, ISBN-9780230322301

Course Outcomes

CO1. Understand mathematical reasoning in order to read, comprehend and construct mathematical arguments

CO2. Count or enumerate objects and solve counting problems and analyze algorithms

CO3. Solve problems in almost every conceivable discipline using graph models

CO4. Solve the linear system of equations and Calculate the eigen values and eigen vectors of matrices.

CO5. Apply the principles of correlation and regression in practical problems.

BCA-402 DISCRETE MATHEMATICS																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Understand mathematical reasoning in order to read, comprehend and construct mathematical arguments	3	3	2	2	1	2	3	2	3	3	3	3	3	2	3	2	3	1	3	3
CO2. Count or enumerate objects and solve counting problems and analyze algorithms	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	2	3	1	3	3
CO3. Solve problems in almost every conceivable discipline using graph models	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	2	3	1	3	3
CO4. Solve the linear system of equations and Calculate the eigen values and eigen vectors of matrices.	3	3	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	1	3	3
CO5. Apply the principles of correlation and regression in practical problems.	3	3	3	3	2	3	3	2	3	3	3	3	3	2	3	3	3	2	3	3

BCA-403 ENVIORNMENTAL SCIENCE

Syllabus

Ecosystems and how they work: Structure and function of an ecosystem, Types of Eco-Systems, Producers, Consumers and Decomposers, Food chains, food webs and ecological Pyramids, Energy flow in the ecosystem. Introduction, Types, Characteristic features, Structure and Function of Forest ecosystem, Desert ecosystem, Aquatic ecosystems Lithosphere, Biosphere and Hydrosphere, Major issues of Biodiversity, Biosphere reserves, National Parks and sanctuaries.

Concept of sustainability and international efforts for environmental protection: Concept of Sustainable Development, Emergence of Environmental Issues, International Agreement on Environmental Management.

Human Population Growth and its effects on the environment: Problem of Population growth, poverty and environment, Population Explosion, Family Welfare Programme.

Renewable and non-renewable resources: Defining resources, classification of resources, soil and land degradation, economic development and resources use, natural resources accounting. Energy needs, renewable and non renewable energy resources, Solar energy and its availability, wind power and its potential, hydropower as a clean source of energy, coal, oil, natural gas etc.

Water Pollution: Water resources of India, Hydrological Cycle, methods of water conservation and management, ground and surface water pollution. Recycling and management of water and wastewater (domestic and industrial). Water borne diseases and health related issues.

Air Pollution: Air pollution and air pollutants, sources of air pollution, its effect on human health and vegetation. Green house effect, global warming and climate change. Ambient air quality standards, steps taken by Government to control air pollution. Noise pollution and its impacts on human health.
Solid Waste: Municipal Solid Waste Management, segregation, disposal methods, composting, land fill sites etc. Hazardous waste management, biomedical waste management.

Environmental Impact Assessment (EIA) and Environmental Management System (EMS): Introduction to EIA, its impact and case study, environmental information system (EIS), role of information technology in environment.

Indian Environmental laws: Legal framework: Constitutional provisions, the Indian Penal Code, Role of Judiciary in Environmental Protection, Wild Life (Protection) Act, 1972, Water

(Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution) Act, 1981, Forest Conservation Act

Text Books:

1. Gupta N.C.; Social Auditing of Environmental Law in India, edited book, New Century Publications, Delhi-2003.
2. Agarwal, A, Narain; S. State of India's Environment, Published by Centre for Science and
   Environment, New Delhi, 1999.
3. Ambasht, R.S. and P.K. Ambasht; Environment and Pollution-An Ecological Approach, third edition, CBS Publishers, New Delhi, 1999

Course Outcomes

CO1. Gain in-depth knowledge on natural processes that sustain life, and govern economy.

CO2. Predict the consequences of human actions on the web of life, global economy and quality of human life.

CO3. Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.

CO4. Acquire values and attitudes towards understanding complex environmental-economic social challenges, and participating actively in solving current environmental problems and preventing the future ones.

CO5. Adopt sustainability as a practice in life, society and industry.

BCA-403 ENVIORNMENTAL SCIENCE																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Gain in-depth knowledge on natural processes that sustain life, and govern economy.	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO2. Predict the consequences of human actions on the web of life, global economy and quality of human life.	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO3. Develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.	3	3	2	3	2	3	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO4. Acquire values and attitudes towards understanding complex environmental-economic social challenges, and participating actively in solving current environmental problems and preventing the future ones.	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3
CO5. Adopt sustainability as a practice in life, society and industry.	3	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3	3	1	3	3

BCA-404 MANAGEMENT INFORMATION SYSTEM

Syllabus

Introduction to system and Basic System Concepts, Types of Systems, The Systems Approach, Information System: Definition & Characteristics, Types of information, Role of Information in Decision-Making, Sub-Systems of an Information system: EDP and MIS management levels, EDP/MIS/DSS.

An overview of Management Information System: Definition & Characteristics, Components of MIS, Frame Work for Understanding MIS: Information requirements &Levels of Management, Simon's Model of decision-Making, Structured Vs Un-structured decisions, Formal vs. Informal systems.

Developing Information Systems: Analysis & Design of Information Systems: Implementation & Evaluation, Pitfalls in MIS Development.

Functional MIS: A Study of Personnel, Financial and production MIS, Introduction to e-business systems, ecommerce – technologies, applications, Decision support systems – support systems for planning, control and decision-making

Text Books:

1. J. Kanter, "Management/Information Systems", PHI.
2. Gordon B. Davis, M. H. Olson, "Management Information Systems – Conceptual foundations, structure and Development", McGraw Hill.

Reference Book:

1. James A. O'Brien, "Management Information Systems", Tata McGraw-Hill

Course Outcomes

CO1. Relate the basic concepts and technologies used in the field of management information systems.
CO2. Compare the processes of developing and implementing information systems.
CO3. Outline the role of the ethical, social, and security issues of information systems.
CO4. Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
CO5. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

BCA-404 MANAGEMENT INFORMATION SYSTEM																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Relate the basic concepts and technologies used in the field of management information systems.	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO2. Compare the processes of developing and implementing information systems.	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO3. Outline the role of the ethical, social, and security issues of information systems.	3	3	2	3	2	3	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO4. Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3
CO5. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.	3	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3	3	1	3	3

BCA-405 INTERNET AND WEB DESIGN

Syllabus

Use XML standards and tools towards smart web applications

Basics of Internet: Basic concepts, Communication on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP Address, A brief overview of TCP/IP and its Services, Transmission Control Protocol, Web Server, Web Client, Domain Registration.

Introduction to HTML: HTML, HTML Tags, Commonly Used HTML Commands, Title and Footers, Text Formatting, Text Style, Lists, Adding Graphics to HTML Documents, Tables, Linking Documents, Frames.

Java Script : Java Script in Web Pages, Advantages of Java Script, Advantages of JavaScript, Data Types and Literals, Type Casting , Java Script Array, Operators and Expression, Conditional Checking , Function, User Defined Function. Understanding XML: SGML, XML, XML and HTML

Creation of Dynamic Web pages using JSP: Dynamic Web Page, Introduction of JSP, Pages Overview, JSP Scripting, Standard Action, Page Directive, Include Directive.

Text Books:

1. Ivan Bay Ross - Web Enable Commercial Application Using HTML, DHTML, BPB Publication.
2. Michel Morrison - HTML and XML for Beginners, PHI, New Delhi- 200
3. H.M Dietal and P.J Dietal - Java How to Program, PHI, New Delhi- 2005

Reference Book:

1. Java Server Side Programming -WROX Publication

Course Outcome

This course will enable students to understand the concepts and techniques underlying website creation with HTML, CSS and client scripting with JavaScript. It will also equip students with latest web development applications Angular JS, Server scripting with PHP and XML.

CO1. Understand basics of web technologies.
CO2. Create interactive web applications using latest web technologies.
CO3. Publish and maintain interactive web applications.

BCA-405 INTERNET AND WEB DESIGN																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Understand basics of web technologies.	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO2. Create interactive web applications using latest web technologies.	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO3. Publish and maintain interactive web applications	3	3	2	3	2	3	3	2	3	3	3	2	3	3	3	3	3	2	3	3

SEMESTER-V

SEMESTER - 5									
THEORY		PERIOD			Evaluation Scheme			Credit	Hours
CODE	NAME OF THE PAPER	LECTURES	TUTORIALS	PRACTICALS	IA	ESE	SUB-TOTAL		
BCA 501	Windows Programming using VB.Net	4	1	0	30	70	100	5	4
BCA 502	Organizational Behaviour	4	1	0	30	70	100	5	5
BCA 503	Python Programming	4	1	0	30	70	100	5	5
BCA 504	E-Commerce	4	0	0	30	70	100	4	4
BCA 505	Business English	4	0	0	30	70	100	4	4
BCA 506	Windows Programming using VB.Net LAB	0	0	4	30	70	100	2	4
BCA 507	Python Programming LAB	0	0	4	30	70	100	2	4
							Total Credit:	27	

IA = Internal Assessment, **ESE** = End Semester Exam

BCA-501 WINDOWS PROGRAMMING USING VB.NET

Syllabus

Introduction to .Net Technology:

Why .Net? The .Net Framework Class Library, Working with the .Net FCL, Namespaces, Types of a .Net Namespace.

The Visual Basic.Net Language

VB.Net Data types, Operators, Decision Statements- If..then, If..then..else, Select.. Case, Loop Statements- While, Do.. Loop, For .. Next, For Each ..Next, Arrays.

OOP using VB.Net

Object Oriented features- Abstraction, Encapsulation, Polymorphism, Inheritance, Declaring Classes, Implementing Typecasting, Procedures and Functions, Optional arguments, Error handling in Procedures, Properties, Public and Private variables, Types of Properties, Polymorphism, Inheritance, Method Overriding.

Windows Form

Introduction to Class Libraries, Event and Event Handlers, Windows Application, Windows GUI, First Win Forms Application, Controls, Text controls, Selection List Controls, VB.Net is overridden, Some controls with examples. **Error handling In Windows Forms:** Types of Validations, Types of Errors, Exceptions, Classified Runtime based Exceptions. **SDI and MDIApplications:** SDI and MDI interfaces, Characteristics of MDI components, Creating MDI Forms.

Data access with ADO.Net

Overview of Microsoft Database Access Technology, ADO.Net, Creating a Database, ADO.Net Architecture, ADO.Net Class Libraries, Databound Controls, Creating a Data Set, Using XML Data.

Text Books:

1. "Dot Net Technology" by Damini Grover
2. "Visual Basic .NET Programming Black Book" by Steven Holzner

Reference Book:

1. "Programming with C# .Net" by Sathiaseelan J G R
2. "Peter Aitken's Visual Basic .Net Programming" by Peter Aitken

Course Outcome

CO1. Design, formulate, and construct applications with VB.NET
CO2. Integrate variables and constants into calculations applying VB.NET
CO3. Determine logical alternatives with VB.NET decision structures
CO4. Implement lists and loops with VB.NET controls and iteration
CO5. Separate operations into appropriate VB.NET procedures and functions
CO6. Assemble multiple forms, modules, and menus into working VB.NET solutions
CO7. Create VB.NET programs using multiple array techniques
CO8. Build integrated VB.NET solutions using files and structures with printing capabilities
CO9. Translate general requirements into data-related solutions using database concepts
CO10. Know the working environment of visual basics using a control structure
CO11. Understand the module, components and menu editor and its concept in a simple manner

BCA-501 WINDOWS PROGRAMMING USING VB.NET																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Design, formulate, and construct applications with VB.NET	3	2	3	3	2	2	2	3	3	2	3	2	2	3	2	3	2	3	3	3
CO2. Integrate variables and constants into calculations applying VB.NET	3	3	2	3	2	2	2	3	3	2	3	3	2	3	2	3	2	3	3	3
CO3. Determine logical alternatives with VB.NET decision structures	2	2	2	2	3	2	2	3	2	3	3	2	2	3	2	3	3	3	2	3
CO4. Implement lists and loops with VB.NET controls and iteration	3	3	3	3	3	3	2	3	3	3	3	2	2	2	3	3	3	3	3	3
CO5. Separate operations into appropriate VB.NET procedures and functions	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3	3	3	3
CO6. Assemble multiple forms, modules, and menus into working VB.NET solutions	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3
CO7. Create VB.NET programs using multiple array techniques	3	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3	3	1	3	3
CO8. Build integrated VB.NET solutions using files and structures with printing capabilities	3	3	3	3	3	3	2	3	3	3	3	2	2	2	3	3	3	3	3	3
CO9. Translate general requirements into data-related solutions using database concepts	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3	3	3	3
CO10. Know the working environment of visual basics using a control structure	3	3	3	3	3	3	2	3	3	3	3	2	2	2	3	3	3	3	3	3
CO11. Understand the module, components and menu editor and its concept in a simple manner	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3	3	3	3

BCA-502 ORGANIZATIONAL BEHAVIOUR

Syllabus

Fundamentals of Organizational Behavior: Nature, Scope, Definition and Goals of Organizational Behavior, Fundamental Concepts of Organizational Behaviour, Models of Organizational Behavior ,Emerging aspects of Organizational Behavior: TQM, Managing Cultural Diversity, Managing the Perception Process

Attitude Values and Motivation: Effects of employee attitudes Personal and Organizational Values Job Satisfaction Nature and Importance of Motivation Achievement Motive Theories of Work Motivation: Maslow's Need Hierarchy Theory, McGregers's Theory 'X' and Theory 'Y'

Personality: Definition of Personality, Determinants of Personality Theories of Personality – Trait and Type Theories, The Big Five Traites, Mytes-Briggs Indicator, Locus of Control, Type A and Type B Assessment of Personality

Work Stress: Meaning and definition of Stress, Symptoms of Stress Sources of Stress: Individual Level, Group Level, Organizational Level Stressors, Extra Organizational Stressors Effect of Stress
– Burnouts Stress Management – Individual Strategies, Organizational Strategies Employee Counseling

Group Behavior and Leadership: Nature of Group, Types of Groups Nature and Characteristics of team building, Effective Teamwork Nature of Leadership, Leadership Styles Traits of Effective Leaders

Text Books:

1. Organizational Behavior Text, Cases and Games- By K. Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
2. Organizational Behavior Human Behavior at Work By J. W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12 th Edition (2007)
3. Organizational Behavior through Indian Philosophy by N.M Mishra Himalaya Publication House.

Course Outcome

CO1. Students will be able to explain the concept of Organization Design and determine the factors that affect Organization Design.

CO2. Students will be able to identify the components of Individual Behavior and apply the concept of Learning, Perception, Attitudes and values.

CO3. The student will be able to distinguish between the various theories of motivation and their application in organizations and also be able to apply these theories to practical problems in organizations.

CO4. They will also be able to distinguish between a number of different leadership theories & styles and contribute to the effective performance of a team as the team leader or a group member.

CO5. The future managers/ students will be able to analyze the behavior of individuals and groups in organizations in terms of the key factors that influence organizational behavior and demonstrate skills required for working in groups (team building).

CO6. The students will be able to justify how organizational change and conflict affect working relationships within organizations and demonstrate how to apply relevant theories to solve problems of change and conflict within organizations.

BCA-502 ORGANIZATIONAL BEHAVIOUR																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Students will be able to explain the concept of Organization Design and determine the factors that affect Organization Design.	3	3	2	2	3	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3
CO2. Students will be able to identify the components of Individual Behavior and apply the concept of Learning, Perception, Attitudes and values.	3	3	2	3	3	2	3	3	3	3	3	3	3	2	3	3	3	3	3	3
CO3. The student will be able to distinguish between the various theories of motivation and their application in organizations and also be able to apply these theories to practical problems in organizations.	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO4. They will also be able to distinguish between a number of different leadership theories & styles and contribute to the effective performance of a team as the team leader or a group member.	2	2	2	2	3	2	2	3	2	3	3	2	2	3	2	3	3	3	2	3
CO5. The future managers/ students will be able to analyze the behavior of individuals and groups in organizations in terms of the key factors that influence organizational behavior and demonstrate skills required for working in groups (team building).	3	3	3	3	3	3	2	3	3	3	3	2	2	2	3	3	3	3	3	3
CO6. The students will be able to justify how organizational change and conflict affect working relationships within organizations and demonstrate how to apply relevant theories to solve problems of change and conflict within organizations.	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3	3	3	3

BCA-503 PYTHON PROGRAMMING

Syllabus

Overview of Programming: Structure of a Python Program, Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

Creating Python Programs: Input and Output Statements, Control statements(Branching, Looping, Conditional Statement, Exit function, Difference between break, continue), Defining Functions, default arguments, Errors and Exceptions.

Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Implementing 2-D matrices.

Strings and Lists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists .

Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries. Overview of stacks and queues.

Text Books:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Introduction to computation and programming python, by John Guttag, MIT Press.
3. Learning Python, Lutz and Ascher, O'Reilly publications

Web Resources:

1. http://files.swaroopch.com/python/byte_of_python.pdf
2. https://www.cs.uky.edu/~keen/115/Haltermanpythonbook.pdf
3. http://greenteapress.com/thinkpython/thinkpython.pdf
4. Python turorials: https://docs.python.org/3/tutorial/index.html

Course Outcome

CO1. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python

CO2. Express different Decision Making statements and Functions

CO3. Interpret Object oriented programming in Python

CO4. Understand and summarize different File handling operations

CO5. Explain how to design GUI Applications in Python and evaluate different database operations

CO6. Design and develop Client Server network applications using Python

BCA-503 PYTHON PROGRAMMING																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python	3	3	2	3	3	3	3	3	3	2	3	2	3	3	2	3	3	3	3	3
CO2. Express different Decision Making statements and Functions	3	3	2	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO3. Interpret Object oriented programming in Python	3	3	3	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO4. Understand and summarize different File handling operations	3	3	3	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO5. Explain how to design GUI Applications in Python and evaluate different database operations	3	3	3	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	3
CO6. Design and develop Client Server network applications using Python	3	3	3	3	3	2	3	3	3	2	3	3	3	3	2	3	3	3	3	3

BCA-504 E-COMMERCE

Syllabus

Introduction to E-commerce: E-commerce: The revolution is just beginning, The visions and forces behind E-commerce, Understanding E-commerce.

E-commerce business models and concepts: E-commerce business models, Major business-to-consumer (B2C) business models, Major business-to-business (B2B) business models, Business models in emerging E-commerce areas, How the internet and the Web change business.

E-commerce infrastructure: The Internet, Technology background, the internet today, The worldwide web. **Building an E-commerce web site:** A systematic approach, choosing server software, choosing the hardware for an E-commerce site, other E-commerce site tools.

Security and Encryption: The E-commerce security environment, Security threats in the E-commerce environment, Technology solutions, Policies, Procedures and Laws.

E-commerce payment systems: Payment systems, Credit card E-commerce transactions, E-commerce digital payment systems in the B2C arena, B2B payment systems. Ethical, Social, and Political issues in E-commerce: Understanding ethical, social, and political issues in E-commerce, Privacy and information rights, Intellectual property rights, Governance, Public safety and welfare.

Text Book:

1. K.C. Laudon& C.G. Traver, E-commerce, Pearson Education, 2003.

Reference Books:

1. R. Kalakota & A.B.Whiilston-' Frontiers of Electronic Commerce, Pearson Education-2006.
2. K.K.Bajaj & D.Nag- E-Commerce, Tata McGraw Hill, New Delhi, Second Edition.

Course outcome

CO1. After Completion of the subject student should able to understand the basic concepts and technologies used in the field of management information systems.

CO2. Have the knowledge of the different types of management information systems.

CO3. Understand the processes of developing and implementing information systems.

CO4. Be aware of the ethical, social, and security issues of information systems.

BCA-504 E-COMMERCE																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. After Completion of the subject student should able to understand the basic concepts and technologies used in the field of management information systems.	3	3	3	2	2	3	3	2	3	2	3	3	3	2	3	2	3	3	3	2
CO2. Have the knowledge of the different types of management information systems.	3	3	3	3	2	3	3	2	3	2	3	3	3	3	3	2	3	3	3	2
CO3. Understand the processes of developing and implementing information systems.	3	3	3	3	3	2	3	2	3	2	3	3	3	3	3	2	3	3	3	3
CO4. Be aware of the ethical, social, and security issues of information systems.	3	3	3	3	2	3	3	2	3	2	3	3	3	3	3	2	3	3	3	2

BCA-505 BUSINESS ENGLISH

Syllabus

Grammar: Expressing in Style; Words often confused; One-word substitution; Phrases; Idioms.

Advanced Reading: Paraphrasing; interpreting visual information: Tables, Graphs, Charts; Speed Reading. Comprehension and Analysis of the book, "Who Moved My Cheese."

Effective Writing: Business Correspondences: Fax, Email; Taking Notes; Making Inquiries; Placing Orders; Asking & Giving Information; Registering Complaints; Handling Complaints; Drafting Notices; Job Applications; Expository Composition; Argumentative Composition; Techniques of Argument; Logical Presentation; Descriptive Composition; Narrative Composition; Summary Writing, Proposal; Abstract, Agenda, Minutes.

Speaking: Business Etiquettes; Impromptu Speech; Debate; Role Play; Presentations.

Listening: Business-related Conversation Exercises.

Text Book:

1. Spencer Johnson; Who Moved My Cheese; Vermilion; (2009).
2. Balasubramanian, T., A Textbook of English Phonetics for Indian Students; Macmillan India, Delhi (1998).
3. McLearn, Stephen., Writing Essays and Report: A Student's Guide; Viva Books, New Delhi (2011).

Reference Books:

1. Burton Roberts, N., Analysing Sentences; Longman, London (1986).
2. Wekker, H. And Haegeman, L., A Modern Course in English Syntax; Croom Helm, London (1985).

Course Outcome

CO1. Educate students in both the artistry and utility of the English language through the study of literature and other contemporary forms of culture.

CO2. Provide students with the critical faculties necessary in an academic environment, on the job, and in an increasingly complex, interdependent world.

CO3. Graduate students who are capable of performing research, analysis, and criticism of literary and cultural texts from different historical periods and genres.

CO4. Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning.

BCA-505 BUSINESS ENGLISH																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Educate students in both the artistry and utility of the English language through the study of literature and other contemporary forms of culture.	3	3	2	2	1	2	3	1	2	2	3	3	3	2	2	2	3	1	2	2
CO2. Provide students with the critical faculties necessary in an academic environment, on the job, and in an increasingly complex, interdependent world.	3	3	2	2	1	3	3	2	3	3	3	3	3	3	3	2	3	3	3	2
CO3. Graduate students who are capable of performing research, analysis, and criticism of literary and cultural texts from different historical periods and genres.	3	3	2	3	1	3	3	2	3	3	3	3	3	3	3	2	3	3	3	2
CO4. Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning.	3	3	2	2	1	3	3	2	3	3	3	3	3	3	3	2	3	3	3	2

SEMESTER-VI

SEMESTER - 6									
THEORY		**PERIOD**			**Evaluation Scheme**			**Credit**	**Hours**
CODE	**NAME OF THE PAPER**	**LECTURES**	**TUTORIALS**	**PRACTICALS**	**IA**	**ESE**	**SUB-TOTAL**		
BCA 601 (A)	**Advanced web Technology**	5	0	0	30	70	100	5	5
BCA 601 (B)	**Data Mining & Data warehouse**	5	0	0	30	70	100	5	5
BCA 602	**Software Project Management**	5	0	0	30	70	100	5	5
BCA 603	**Project & Viva**	0	0	0	0	0	300	12	0
							Total Credit:	**22**	

NOTE: -Students have to select one of the papers from 601(A) or 601(B)

IA = Internal Assessment, **ESE** = End Semester Exam

BCA-601 (A) ADVANCED WEB TECHNOLOGY (ELECTIVE-1)

Syllabus

Web2.0 and XHTML: What Is Web 2.0? Introduction to Web 2.0 terms: Search, Content Networks, Blogging, Social Networking, Social Media, Rich Internet Applications (RIAs), Web Services, Introduction to XHTML, Syntactic Differences between HTML and XHTML, Standard XHTML Document Structure, An example of XHTML covering Basic Syntax, Images, Hypertext Links, Lists and Tables, Creation of an XHTML Form, Internal Linking and Meta Elements.

Introduction to XML: XML Basics, XML Document Structure, XML Name-spaces, Document Type Definitions, XML Schema, Displaying XML Documents, XSL and CSS.

Programming with Java Script – DOM and Events: The Document Object Model, Element Access in Java Script, Traversing and Modifying a DOM Tree, DOM Collections and Styles, Events, Examples of Event Handling from Body, Button, Text Box and Password Elements, Dynamic Documents using JavaScript – element moving, visibility, positioning etc., Example program (s), Introduction and example of AJAX.

The Server Side Scripting: Server side scripting and its need ,Two-Tier, Three-Tier, N-Tier and Enterprise Architecture, Various Languages / Technologies for server scripting, HTTP Methods (such as GET,POST,HEAD, and so on), Purpose, Technical characteristics, Method selection, Use of request and response primitives, Web container – Tomcat.

JSP – Basics: Basic JSP Life-cycle, JSP Directives and Elements, Script-lets, Expressions, Action Elements, Standard Actions, Comments and Template Data, JSP variables, The out Object, Request, response, sessions and application objects.

JSP Applications: Exceptions and exception handling using JSP, Cookies and sessions, Managing Email using JSP.

JSP Application Development: Applications using JSP, What is JDBC? Need for JDBC, Database Drivers, Connection using JDBC API, Application development and deployment.

Text Books:

1. Ivan Bay Ross- Web Enable Commercial Application Using HTML, DHTML, BPB Publication

2. Michel Morrison -HTML and XML for Beginners, PHI, New Delhi- 2001
3. H.M Dietal and P.J Dietal -Java How to Program, PHI, New Delhi- 2005

Reference Book:

1. Java Server Side Programming -WROX Publication
2. David S. Plat : Introducing Microsoft .Net, Microsoft Press.

Course Outcome

CO1. Understand basics of web technologies.
CO2. Create interactive web applications using latest web technologies.
CO3. Publish and maintain interactive web applications.
CO4. Use XML standards and tools towards smart web applications.

BCA-601 (A) ADVANCED WEB TECHNOLOGY (ELECTIVE-1)																					
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Understand basics of web technologies.	3	3	2	2	1	2	3	2	3	3	3	3	3	2	3	2	3	1	3	3
CO2. Create interactive web applications using latest web technologies.	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	2	3	1	3	3
CO3. Publish and maintain interactive web applications.	3	3	2	2	1	2	3	2	3	2	3	3	3	2	3	2	3	2	3	2
CO4. Use XML standards and tools towards smart web applications.	3	3	3	3	2	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3

BCA-601 (B) DATA MINING AND DATA WAREHOUSING (ELECTIVE-2)

Syllabus

Understand the concept of Online analytical processing (OLAP) and its implementation
Data mining Introduction: Definition, Data mining tasks, Data mining as a step of Knowledge discovery process, Applications of Data mining; Data objects and types of attributes, recalling mean, median, mode and weighted arithmetic mean.

Data quality, overview of data preprocessing. Classification analysis- definition, Overview of various classification techniques; Decision tree induction- working, examples, specifying attribute test conditions.

Differences between Operational Database and Data Warehouse–Multi-dimensional Data Model - From Tables to Data Cubes. Schemas, Measures, DW Implementation – Efficient Computation of Data Cubes.

Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept of Hierarchy Generation, Task relevant Data, Background Knowledge, Presentation and Visualization of Discovered Patterns.

Association Rule Mining, Classification and Prediction – Decision Tree, Baysian Classification Back Propagation, Cluster Analysis, Outlier Analysis.

Web Content Mining, Web Structure Mining, WebUsages Mining, Spatial Mining, Generalization and specialization, Spatial Rules, Spatial Classification and Clustering Algorithms, Temporal Mining, Modeling Temporal Events, Times Series, Pattern Detection, Sequences.

Reference Books:

1. Jiawei I-lan&MichelineKambler, "Data Mining: Concepts and Techniques",
2. Harcourt India Pvt. Ltd., First Indian Reprint, 2001
3. Margaret H. Dunham, "Data Mining : Introduction and Advance Topics", Pearson Education, First Indian Reprint, 2003

Arun K. Pujari, "Data Mining Techniques", University Press (India) Limited, First edition, 2001

Course Outcome

CO1. Learn fetch the data easily from large value of data

CO2. Understand the tools and technique of data mining

CO3. Able to apply data mining techniques in various application and its case studies

CO4. Know the architecture of data ware house and its application

BCA-601 (B) DATA MINING AND DATA WAREHOUSING (ELECTIVE-2)																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Learn fetch the data easily from large value of data	3	3	2	2	1	2	3	2	3	3	3	3	3	2	3	2	3	1	3	3
CO2. Understand the tools and technique of data mining	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	2	3	1	3	3
CO3. Able to apply data mining techniques in various application and its case studies	3	3	2	3	2	2	3	2	3	3	3	3	3	3	3	2	3	1	3	3
CO4. Know the architecture of data ware house and its application	3	3	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	1	3	3

BCA-602 SOFTWARE PROJECT MANAGEMENT

Syllabus

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index
(SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Text Books:

1. Software Project Management by M.Cotterell
2. Information Technology Project Management
3. Software Project Management by S.A Kelkar

Course Outcome

CO1. Design and implement Test Plans and Procedures

i. Students can design comprehensive test plans
ii. Students can create test procedures
iii. Students can evaluate the results of tests

iv. Students can assess a software process to evaluate how effective it is at promoting quality

CO2. Apply a wide variety of testing techniques at various testing levels

i. Students differentiate the purposes and applicable techniques among the various levels of testing: unit, integration, system, acceptance, usability, and regression testing
ii. Students can conduct effective and efficient inspections
iii. Students can explain and apply graph coverage criteria for structural coverage
iv. Students can explain and apply data flow coverage and logic coverage
v. Students can explain and apply input space partitioning
vi. Students can explain and apply mutation testing

CO3. Use test tools to effectively test software

i. Students can use Junit

CO4. Compute and use various testing metrics

i. Students can compute test coverage and yield, according to a variety of criteria
ii. Students can use statistical techniques to evaluate the defect density and the likelihood of fault

BCA-602 SOFTWARE PROJECT MANAGEMENT																				
COs \ POs / PSOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1. Design and implement Test Plans and Procedures	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO2. Apply a wide variety of testing techniques at various testing levels	3	3	2	3	1	3	3	2	3	2	3	2	3	3	3	3	3	1	3	2
CO3. Use test tools to effectively test software	3	3	2	3	2	3	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO4. Compute and use various testing metrics	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3

NETAJI SUBHAS UNIVERSITY JAMSHEDPUR

BCA-603 PROJECT

Practical Training and Project Work:

1. Project Work may be done individually or in groups(maximum three) in case of bigger projects. However if project is done in group each student must be given a responsibility for a distinct module and care should be taken to monitor the individual student.

2. Project Work can be carried out in the college or outside with prior permission of college.

3. The Student must submit a synopsis of the project report to the college for approval. The Project guide can accept the project or suggest modification for resubmission. Only on acceptance of draft project report the student should make the final copies.

GUIDELINES FOR SUBMISSION OF BCA FINAL YEAR (VI Semester) PROJECT

All the candidates of BCA are required to submit a project-report based on the work done by him/her during the major/minor/summer assignment period.

SUMMARY/ABSTRACT

All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stands out from the rest.

Submission Copy:
The Student should submit spiral bound copy of the project report.

Format of the Report:

(a) Paper:

The Report shall be typed on White Paper of A4 size.

(b) Final Submission:

The Report to be submitted must be original.

(c) Typing:

Font: - Times New Roman
Heading: - 16 pt., Bold
Subheading: - 14 pt, Bold
Content: - 12 pt.
Line Spacing: - 1.5 line.
Typing Side:-One Side
Font Color: - Black.

(d) Margins:

The typing must be done in the following margin: **Left:** 0.75"

Right:0.75"
Top:1"
Bottom:1"
Left Gutter: 0.5"

(e) Binding:

The report shall be Spiral Bound.

(f) Title Cover:

The Title cover should contain the following details:
Top: Project Title in block capitals of 16pt.

Centre: Name of project developer's and Guide name.

Bottom: Name of the university, Year of submission all in block capitals of 14pt letters on separate lines with proper spacing and centering.

(g) Blank sheets:

At the beginning and end of the report, two white blank papers should be provided, one for the Purpose of Binding and other to be left blank.

(h) Content:

I. Acknowledgement

II. Institute/College/Organization certificate where the project is being developed.

III. Table of contents

IV. A brief overview of project
V. Profiles of problem assigned
VI. Study of Existing System
VII. System Requirement
VIII. Project plan

- Team Structure
- Development Schedule

- Programming language and Development Tools

IX. Requirement Specification

X. Design

- Detailed DFD's and Structure Diagram
- Data structure, Database and File

XI. Project Legacy

- Current Status of project
- Remaining Areas of concern
- Technical and Managerial Lessons Learnt
- Future Recommendations

XII. Nomenclature and Abbreviations.

XIII. Bibliography

XIV. Source Code.

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