Department of Computational Sciences
Bachelor of Computer Application (In-house)

Semester I						
Sl. No.	Course Code	Course Name	L	T	P	Credits
Theory						
1	BCA101	Programming for Problem Solving	3	0	0	3
2	BCA102	Soft Skills	3	0	0	3
3	BCA103	Digital Electronics	3	1	0	4
4	BCA104	Basic Mathematical Computation	3	1	0	4
Practical						
1	BCA191	Programming for Problem Solving Lab	0	0	4	2
2	BCA192	Soft Skill Lab	0	0	4	2
3	BCA195	PC Software Lab	0	0	4	2
		Total Credit				20

Course Name: Programming for Problem Solving
Course Code: BCA101
Contact: 3L
Credits: 3
Allotted Hrs: 36

UNIT I: Programming Basics [2L]
Problem analysis, Flowchart, algorithms, Pseudo codes, structured programming, Example of Flowchart and Algorithm representation, Brief History of Development of C language, Features of C language, Process of compiling and running a C program.

UNIT II: Variable and Constants [3L]
Definition of Tokens, variables, Constant, Classification of constants, data types [Primary data types, User defined data types, Derived data types]

UNIT III: Operators and Expressions [4L]
Different types of Operators [Arithmetic, Relational, Logical, Assignment, Increment and Decrement,Conditional, Bitwise, Special, expressions, type conversion, Operator precedence, associatively rules on operators.

UNIT IV: Formatted Input/output [4L]
scanf[] Format code, printf[] Format code, reading and writing character variable, character testing functions [isdigit[], islower[], isupper[], tolower[], toupper[]].

UNIT V: Decision Making And Branching [4L]
If statement, if..else, Nested if ..else, else if ladder, switch, ternary operator, goto statement [forward and backward jump]

UNIT VI: Looping [5L]
Different types of loop [while, for, do], entry control loop , exit control loop, Applying break and continue within loop.

UNIT VII: Array [4L]
One dimensional array , Two dimensional array, Example using integer and floating array.

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UNIT VIII: String [3L]
Character Array, Library functions related to string [strcat[], strcmp[], strcpy[], strlen[]]

UNIT IX: Function [4L]
Definition, Standard library functions, user-defined functions, recursion, scope of variables in function [auto, extern, static, register]

UNIT X: Pointer And Header File [3L]
Pointer Definition, pointer expression, pointer to an array, pointer to a function. Definition of Header file, Use of header files, Different header files.

Suggested Readings:
1. Programming in ANSI C by E Balagurusamy
2. Programming With C, Gottfried, TMH
3. The C Answer Book, Tondo, PHI
4. Programming & Problem Solving Through C Language, EXCEL BOOKS

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Course Name: Soft Skills
Course Code: BCA102
Contact: 3L
Credits: 3
Allotted Hrs: 36

Unit I: Grammar [6L]
Correction of sentence, Vocabulary / word formation, Single word for a group of words, Fill in the blank, transformation of sentences, Structure of sentences – Active / Passive Voice – Direct / Indirect Narration.

Unit II: Essay Writing [5L]
Descriptive – Comparative – Argumentative – Thesis statement- Structure of opening
/ concluding paragraphs – Body of the essay.

Unit III: Reading Comprehension [5L]
Global – Contextual – Inferential – Select passages from recommended text .

Unit IV: Business Correspondence [5L]
Letter Writing – Formal.Drafting.Biodata- Resume′- Curriculum Vitae.

Unit V: Report Writing [5L]
 Structure , Types of report – Practice Writing.

Unit VI: Communication skills [5L]
Public Speaking skills , Features of effective speech, verbal-nonverbal.

Unit VII: Group discussion [5L]
Group discussion – principle – practice .

Reference Books:
1. Mark MaCormack : "Communication"
2. John Metchell" How to write reports"
3. S R Inthira&amp, V Saraswathi" Enrich your English – a] Communication skills b] Academic skills " Publisher CIEFL &amp, OUP
4. R.C. Sharma and K.Mohan , "Business Correspondence and Report Writing " , Tata McGraw Hill , New Delhi , 1994
5. L.Gartside , "Model Business Letters" , Pitman , London , 1992
6. Longman , "Longman Dictionary of Contemporary English" [or 'Oxford Advanced Learner's Dictionary of Current English' , OUP , 1998.
7. Maxwell Nurnberg and RosenblumMorris , "All About Words" , General Book Depot, New Delhi , 1995
8. A Text Book for English foe Engineers &amp, Technologists

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Course Name: Digital Electronics
Course Code: BCA103
Contact: 3L+1T
Credits: 4
Allotted Hrs: 36

UNIT I:: Number Systems & Codes [5L]

Decimal Number, Binary Number, Octal Number, Hexadecimal Number, Conversion – Decimal to Binary, Binary to Decimal, Octal to Binary, Binary to Octal, Hexadecimal to Binary, Binary to Hexadecimal, Octal to Binary to Hexadecimal, Hexadecimal to Binary to Octal; Floating Point Number Representation, Conversion of Floating Point Numbers, Binary Arithmetic, 1's and 2's Complement, 9's and 10's Complement, Complement Arithmetic, BCD, BCD addition, BCD subtraction, Weighted Binary codes, Non-weighted codes, Parity checker and generator, Alphanumeric codes.

Unit II: Logic Gates [2L]

OR, AND, NOT, NAND, NOR, Exclusive – OR, Exclusive – NOR, Mixed logic.

UNIT III: Boolean Algebra [4L]

Boolean Logic Operations, Basic Law of Boolean Algebra, Demorgan's Theorem, Principle of Duality.

UNIT IV: Minimization Techniques [3L]

Sum of Products, Product of Sums, Karnaugh Map [up to 4 variables].

UNIT V : Multilevel Gate Network [2L]

Implementation of Multilevel Gate Network, Conversion to NAND-NAND and NOR-NOR Gate Networks.

UNIT VI: Arithmetic Circuits [5L]

Half Adder, Full Adder, Half Subtractor, Full Subtractor, Carry Look Ahead Adder, 4-Bit Parallel Adder

UNIT VII: Combinational Circuits [5L]

Basic 2-input and 4-input multiplexer, Demultiplexur, Basic binary decoder, BCD to binary converters, Binary to Gray code converters, Gray code to binary converters, Encoder.

UNIT VIII: Sequential Circuits [5L]

Introduction to sequential circuit, Latch, SR Flip Flop, D Flip Flop, T Flip Flop, JK Flip Flop, Master Slave Flip Flop

UNIT IX : Basics of Counters [2L]

Asynchronous [Ripple or serial] counter, Synchronous [parallel] counter

UNIT X: Basics of Registers [3L]

SISO, SIPO, PISO, PIPO, Universal Registers

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Suggested Readings:

1. Digital Circuit & Design, Salivahan,VIKAS

2. Digital Design, M. Morris. Mano & Michael D. Ciletti, PEARSON

3. Fundamentals of Digital Circuits; Anand Kumar; PHI

4. Digital Electronics; Tokheim; TMH

5. Digital Electronics; S. Rangnekar; ISTE/EXCEL

Course Name: Basic Mathematical Computation
Course Code: BCA104
Contact: 3L+1T
Credits: 4
Allotted Hrs: 36

UNIT I: Linear Algebra [12L]
Determinant and its properties [up to third order], Minor and cofactors, Matrices, addition, multiplication and transpose of a matrix, Symmetric and skew-symmetric matrices and their properties, Adjoint, Inverse matrix, Solution of linear equations in three variables by Cramer's rule and matrix inversion method, Permutation and Combinations, Binomial theorem.

UNIT II: Two Dimensional Geometry [8L]
Locus, Straight lines, Circle, Conic section. Transformation of axes, Plane polar curves.

UNIT III: Differential Calculus [12L]
Limits of functions and continuity, fundamental properties of continuous functions [without proof], Derivatives, Geometric meaning of derivative, successive differentiation, Rolle's theorem, Mean value theorems, Taylor's and Maclaurin's theorem, Taylor's series, Functions of several variables, Limit and Continuity, Partial derivatives, Total differential, Euler's theorem on homogeneous functions of two variables. Tangents and normals.

UNIT IV: Integral Calculus [8L]
Indefinite integrals, Definite integrals and their elementary properties, Definite integral as the limit of sum, Idea of improper integrals. Area under a plane curve.

Suggested Readings:
1. Higher Algebra, S. K. Mapa, Levant Books.
2. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd.
3. Coordinate Geometry, S. L. Loney
4. Integral Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd.
5. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd.
6. Advanced Engineering Mathematics, E Kreyszig, Wiley

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Course Name: Programming for problem solving Lab

Course Code: BCA191

Contact: 4P

Credits: 2

UNIT I: Programming Basics
Write C program to -Implement [main[], printf, scanf] , Print your [name , college name and address], Input an integer number and print it, Input two integer numbers and find sum and difference, Input floating point number and print it, Understand the purpose of header files such as <stdio.h> and <conio.h>

UNIT II: Variable and Constants
Write C program to - Declare variable of different data types and print them, Implement different types of integer and floating point constants

UNIT III: Operators and Expressions
Write C program to - Input integer number and apply different arithmetic operators [+,-,*,/,%], Implement ++ and – operators, Implement assignment operators, Implement bitwise operators.

UNIT IV: Formatted Input/output
Write C programs to - Input character constant and print, Implement scanf[] Format code, Implement printf[] Format code, Implement isdigit[], islower[], isupper[], tolower[] and other functions within <ctype.h>

UNIT V: Decision Making and Branching
Write C programs to – Implement relational operators using if statements, Implement logical operators using if statements, Implement simple if statement, Input two number and find larger number, Input three numbers and find largest, Implement else if ladder, Implement switch ... case, Input two numbers and find larger number using ternary operator, Implement nested ternary operator, Implement pseudo loop using goto statement.

UNIT VI: Looping
Write C programs to - Implement while loop, Implement for loop, Implement do-while loop, Print all even numbers from 2 to 20, Print all odd numbers from 1 to 30, Print all prime numbers from 1 to 50, Print the first 15 Fibonacci terms, Implement nested loop, Print different number patterns, Apply break statement within a loop, Apply continue statement within a loop, Input a 3-digit number to find sum of digits, Input a 3-digit number and print in reverse order, Find factorial of a number.

UNIT VII: Array
Write C programs to - Implement an array arr[10] scanf value and print, Implement an array arr[10] scanf value and print value in reverse order, Implement an array arr[3][3] scanf value and print values, Find the sum of even and odd numbers within an array separately, Find the row wise sum of an 2-d array arr[4][4].

UNIT VIII: String
Write C programs to - Implement scan and print string, implement different string functions such as strcat[], strcmp[],
strcpy[], strlen[] ,Note - include<string.h> in the programs.

UNIT IX: Function
Write C program to –Implement different library functions, Implement UDF with no argument and no return type, Implement UDF with argument and no return value, Implement UDF with argument and with return value, Implement UDF with no return value and with return value, Implement auto, extern, static and register variables, Implement chaining of UDF, Implement recursion to find factorial.

UNIT X: Pointer and Header File
Write C program to -Implement Pointer, Implement pointer expression, Implement pointer to an array, Implement pointer to a function, Implement simple macro, Implement nested macro.

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NH-12 [Old NH-34], Simhat, Haringhata, Nadia -741249

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Course Name: Soft Skill Lab
Course Code: BCA192
Contact: 4P
Credits: 2

1. Honing 'Listening Skill' and its sub skills through Language Lab Audio device.
2. Honing 'Speaking Skill' and its sub skills.
3. Helping them master Linguistic/Paralinguistic features [Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch &Accent] of connected speech.
4. Honing 'Conversation Skill' using Language Lab Audio –Visual input, Conversational Practice Sessions [Face to Face / via Telephone , Mobile phone & Role Play Mode].
5. Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success.
6. GD Practice Sessions for helping them internalize basic Principles [turn- taking, creative intervention, by using correct body language, courtesies & other soft skills] of GD.
7. Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages, Learning Global / Contextual / Inferential Comprehension.
8. Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input, Practice Sessions.

Course Name: PC Software Lab
Course Code: BCA195
Contact: 4P
Credits: 2

UNIT I: Introduction to Software [Windows 7, Office 2010 [or, respective higher versions]]
Introduction to Windows 7 – Change Date and Time, Task Bar, Start Button,
Creating a File and folder, Saving/Renaming, Moving Files, Renaming, Making a Copy, Copy Files onto a disk Shortcuts, Deleting, Trash Finding Lost or Misplaced Files, Folders and Printing of documents Basic Internet, Email and protection of PC Windows Settings

UNIT II: Microsoft Word
Ribbon, Command Tabs, Hiding the Ribbon, Quick Access Toolbar, Office Menu
Starting a new Document, Saving a document, Previewing a document, Printing a document
Text, Formatting text, Text Boxes, Inserting Clip Art, Working with shapes, Line and Paragraph Spacing Selecting Text, Cut, Copy, Paste, Font, Size, Color, Bold, Italics, Underline Spelling and Grammar Check, Auto Correct, Auto Format Indenting Paragraphs, Paragraph Borders and Shading, Paragraph Alignment and Breaking Creating a table, Editing a table, Sizing a table, Formatting a table Inserting pictures, Setting picture position and text wrapping, Resizing and cropping Using clip art organizer, Creating with Word Art Columns, Headers and Footers, Applying Styles and themes, Mail Merge

UNIT III: Microsoft Excel:
Introduction to MS Excel 2010, Cells, Rows, and Columns, Sheet Tabs, Labeling and Naming Worksheets, Adding and Deleting Worksheets, Hiding/ Unhiding Worksheets, Hiding Columns and

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Rows, Saving Workbooks Printing Worksheets and Workbooks, Select Print Area , Print a Range of Pages, Printing Copying Cells, Rows, and Columns, Pasting Cells, Rows, and Columns, Inserting and Deleting Rows and Columns, Insert Cells Filling Cells with a Series of Data, Editing Cell Data, Find and Replace, Go To Locking Rows and Columns By Splitting Panes, Freezing Panes Change Font Styles and Sizes, Adding Borders and Colors to Cells, Changing Column Width Changing Row Height, Merge Cells, Applying Number Formats, Creating Custom Number Formats Align Cell Contents, Cell Styles, Conditional Formatting Header and Footer, Adding Images, Modifying Images, Rotating an image, Compressing a Picture Adding WordArt, Inserting AutoShapes, Adding Clip Art, Adding a Hyperlink, Embedding an Object Charts, Chart Tools,

Modifying and Moving a Chart, Organizational Charts Formulas and Calculations, Mathematical operators, Creating a Formula Absolute, Relative and Mixed Cell References Excel Forms, Using Data Forms, Entering Data Using a Data Form Entering Data into a Table, Sorting Data into a Table, Filters Data Validation, Auditing, Trace Precedents and Dependents Protecting a Workbook, Importing and Exporting Data, Course Materials

UNIT IV: MS PowerPoint :

Open & close presentations, Create a presentation,Apply design themes, Specify slide transitions & timings, Set up a slide show, Preview, print & run presentations Rearranging and deleting slides, Using slides from other presentations Formatting slides, Formatting text, Formatting paragraphs, Adding shapes, Modifying objects, Using text in objects WordArt, Pictures, Clip art, Tables, Charts, Diagrams Templates and themes, Slide masters, Transitions and timings, Speaker notes, Slide shows

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Semester II						
Sl. No.	Course Code	Course Name	L	T	P	Credits
Theory						
1	BCA201	Computer Architecture	3	0	0	3
2	BCA202	Data Structure with Python	3	0	0	3
3	BCA203	Advanced Mathematical Computation	3	1	0	4
4	BCA204	Software Engineering	3	1	0	4
5	BCA205	Environmental Science	1	0	0	1
Practical						
1	BCA291	Computer Architecture Lab	0	0	4	2
2	BCA292	Data Structure with Python Lab	0	0	4	2
		Total Credit				19

Course Name: Computer Architecture
Course Code: BCA201
Contact: 3L
Credits: 3
Allotted Hrs: 36

UNIT I: Data Representation [4L]
Number Systems – decimal, binary, octal, hexadecimal, alphanumeric representation, 2. Complements – 1's complement, 2' complement, 9's complement, 10' complement, [r-1]'s complement, r's complement, 3. Fixed point representation – Integer representation, arithmetic addition, arithmetic subtraction, overflow, decimal fixed point representation, 4. Floating point representation, 5. IEEE 754 floating point representation

UNIT II: Computer arithmetic [5L]
Addition algorithm of sign magnitude numbers, Subtraction algorithm of sign magnitude numbers, Addition algorithm of signed 2's complement data, Subtraction algorithm of signed 2's complement data, Multiplication algorithm, Booth's algorithm, Division algorithm

UNIT III: Register transfer and micro-operations [5L]
Register transfer language, Register transfer, Bus system for registers, Memory transfers
– memory read, memory write, Micro operations – register transfer micro operations, arithmetic micro operations, logic micro operations, shift micro operations, Binary adder, binary adder subtractor, binary incrementer, arithmetic circuit for arithmetic micro operations, One stage logic circuit,Selective set, Selective complement, Selective clear, Mask, Insert, Clear

UNIT IV: Basic Computer organization and design [4L]
Instruction codes, Direct address, Indirect address & Effective address, List of basic computer registers, Computer instructions: memory reference, register reference & input – output instructions,Block diagram & brief idea of control unit of basic computer, 6. Instruction cycle

UNIT V: Micro programmed control [2L]
Control memory, Address sequencing,Micro program examples

UNIT VI: Central processing unit [5L]
General register organization,Stack organization, Register stack, Memory stack, Stack

operations – push & pop, Evaluation of arithmetic expression using stack, Instruction format, Types of CPU organization [single accumulator, general register & stack organization] & example of their instructions, 6. Three, two, one & zero address instruction, 7. Definition and example of data transfer, data manipulation & program control instructions, 8. Basic idea of different types of interrupts [external, internal & software interrupts], 9. Difference between RISC & CISC

UNIT VII: Pipeline and vector processing [3L]

Parallel processing, Flynn's classification, Pipelining, Example of pipeline, space time diagram, speedup, Basic idea of arithmetic pipeline, example of floating point addition/ subtraction using pipeline

UNIT VIII: Input – output organization [4L]

Peripheral devices,Input – output interface, Isolated I/O, Memory mapped I/O, Asynchronous data transfer: strobe & handshaking, Programmed I/O, Interrupt initiated I/O, Basic idea of DMA & DMAC 8. Input – output processor

UNIT IX: Memory organization [4L]

Memory hierarchy, Main memory definition, types of main memory, types of RAM, ROM, difference between SRAM & DRAM, Cache memory, Cache memory mapping – Direct, Associative, Set Associative, CAM, hardware organization of CAM, Virtual memory, mapping using pages, page fault, mapping using segments, TLB, Auxiliary memory, diagrammatic representation of magnetic disk & hard disk drive, Definitions of seek time, rotational delay, access time, transfer time, latency

Suggested Readings:

1. Computer System Architecture, M. Morris Mano, PEARSON
2. Computer Organization & Architecture – Designing For Performance, William
3. Stallings, PEARSON
4. Computer Architecture & Organisation, J.P. Hayes, TATA MCGRAW HILL
5. Computer Organization and Architecture, T. K. Ghosh, TATA MCGRAW-HILL
6. Computer Architecture, Behrooz Parhami, OXFORD UNIVERSITY PRESS

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Course Name: Data Structures with Python
Course Code: BCA202
Contact: 3L
Credits: 3
Allotted Hrs: 36

UNIT I: Concepts of Abstract data type [4L]
Concept of abstract data types, Structure, union, enum, pointer to structure, Self referential structure, Pointer
to pointer

UNIT II: Dynamic Memory Allocation [4L]
Difference between static and dynamic memory allocation, Using functions such as malloc[],
calloc[], realloc[], free[].

UNIT III: File Management [4L]
Application of functions such as fopen[], fclose[], getc[], putc[], fprintf[], fscanf[], getw[], putw[],
command line
argument.

UNIT IV: Data Structure using Array [4L]
stack, queue, circular queue, priority queue, dequeue and their operations and applications.

UNIT V: Searching and Sorting [6L]
Searching: linear search, Binary search, their comparison, Sorting: insertion sort, Selection sort. Quick
sort, Bubble sort Heap sort, Comparison of sorting methods , Analysis of algorithm, complexity using
big 'O' notation

UNIT VI: Linked List [4L]
Linear link lists, doubly linked lists, stack using linked list, queue using linked list, circular linked list
and their operations
and applications.

UNIT VII: Trees [5L]
Binary trees, binary search trees, representations and operations, thread representations, sequential
representations, B tree , B+ tree,

UNIT VIII: Graphs [5L]
Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph,
Representation of graphs, Graph Traversal: Depth first search and Breadth first search. Spanning
Trees, minimum spanning Tree, Shortest path algorithm

UNIT IX: Hashing [4L]
Definition, Hashing functions, Load factor and collision, open addressing [linear probing] and
chaining method to avoid collision

Suggested Readings:
1. Data Structures in C, Ajay Agarwal, Cyber Tech
2. Data Structures Using C, Radhakrishnan & Shrinivasan, ISTE/EXCEL BOOKS
3. C and Data Structure,Radhaganesan,Scitech
4. Data Structure Using C & C++, Tannenbaum, PHI
5. Mastering Algorithms with C,Loudon,SPD/O'REILLY

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Course Name: Advanced Mathematical Computation
Course Code: BCA203
Contact: 3L+1T
Credits: 4
Allotted Hrs: 36

UNIT I: Algebra [20L]
Abstract Algebra: Sets, Algebra of sets and their applications, Relations, Mapping, Compositions, Groups, Abelian groups, Sub-groups, Cyclic groups, Notion of ring and fields. Complex numbers, Modulus and amplitudes, De Moivre's theorem
Polynomials, Division algorithm, Fundamental theorem of classical algebra [statement only], Descart's rule of sign, Relation between roots and coefficients, symmetric function of the roots, transformation of polynomial equations, Binomial equations

UNIT II: Differential Equations [14L]
Order, degree, formation of a differential equation, Solutions of ODE, First order and first degree: Variable separation method, Homogeneous equations, Exact equations, Condition of exactness [statement only], Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree, Clairaut's equation, second order linear ODE with constant coefficients, Solutions using D operator method. Cauchy-Euler equations and their solutions

UNIT III: Sequence and Series [6L]
Bounded and unbounded sequences, convergence or divergence of a sequence, behaviour of monotone sequences, algebra of convergent sequences, Cauchy's sequence, Cauchy's general principle of convergence, infinite series – its convergence and sum, series with positive terms and standard tests of convergence [without proof], alternating series, Leibnitz test, absolute convergence.

Suggested Readings:
1. Higher Algebra, S. K. Mapa, Levant Books
2. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd
3. Differential Equations, Sheplay L Ross, Wiley
4. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd

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Course Name: Software Engineering
Course Code: BCA204
Contact: 3L+1T
Credits: 4
Allotted Hrs: 36

UNIT I: [12L]
Overview of Computer Based Information System- TPS, OAS, MIS, DSS, KBS
Development Life Cycles- SDLC and its phases Models- Waterfall,
Prototype, Spiral, Evolutionary Requirement Analysis and Specification, SRS
System analysis- DFD, Data Modeling with ERD

UNIT II: [7L]
Feasibility Analysis System design tools- data dictionary, structure chart, decision table, decision tree.
Concept of User Interface, Essence of UML. CASE tool.

UNIT III: [7L]
Testing- Test case, Test suit, Types of testing- unit testing, system testing, integration testing,
acceptance testing Design methodologies: top down and bottom up approach, stub, driver,
black box and white box testing.

UNIT IV: [10L]
ERP, MRP, CRM, Software maintenance SCM, concept of standards [ISO and CMM]

Suggested Readings:
1. System analysis and design, Igor Hawryszkiewycz, Pearson
2. Analysis and design of Information System, V Rajaraman, PHI
3. Software Engineering, Ian Sommerville, Addison-Wesley

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Course Name: Environmental Science
Course Code: BCA205
Contact: 1L
Credits: 1
Allotted Hrs: 12

UNIT I: Introduction [2L]
Introduction to environment and ecology Components of the environment, environmental degradation, natural cycles of environment.

UNIT II: Ecology [2L]
Elements of Ecology, Ecological balance, Effects of Aforestation and deforestation

UNIT III: Air Pollution and Control [2L]
Atmospheric composition, Segments of atmosphere climate, weather, Atmospheric Stability, dispersion of pollutants , Sources and effects of air pollutants, primary and secondary pollutants**,** Criteria Pollutants:PM10, Source, Effect, Control , CO, NO x, **Source, Effect,** Control , SO x, Source, Effect, Control ,Lead, Ozone, Source, Effect, Control ,

Green house effect, Control Measures ,Depletion of ozone layer, Effects of UV exposer, Control Measures

UNIT IV: Water Pollution and Control [2L]
Hydrosphere, natural water resources and reserves, Pollutants: their origin and effects ,COD and BOD test, NBOD and CBOD , River / lake / ground water pollution , Control Measures of water pollution , Drinking water and

waste water treatment

UNIT V: Land Pollution [2L]
Lithosphere, pollutants [municipal, industrial, commercial, agricultural, hazardous solid wastes] their origin and effects , Collection and disposal of solid waste, recycling and treatment methods

UNIT VI: Noise Pollution [2L]
Sources, effects, standards and control

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Course Name: Computer Architecture Lab
Course Code: BCA291
Contact: 4P
Credits: 2

Basic & Fundamental

Basic gates and Universal gates. Implementation of Half & full   adder. Half & full subtractor,

Arithmetic & Logical Units

4 bit logical unit, 4 bit arithmetic unit, BCD adder, 4 bit adder/ subtractor,   Carry   look   ahead adder, Design of ALU for multi bit operation, comparators.

Multiplexer and Decoders

8:1 MUX IC verification, 16:1 MUX using IC 74151, dual 2 to 4 Decoder/   Demultiplexer   IC evaluation. Priority encoder.

Memory

Read/ write operation using RAM IC, Cascading RAM ICs

Course Name: Data Structures with Python Lab
Course Code: BCA292
Contact: 4P
Credits: 2

1. Implementation of array operations.
2. Stacks and Queues: adding, deleting elements .
3. Circular Queue: Adding & deleting elements
4. Merging Problem : Evaluation of expressions operations on Multiple stacks & queues
5. Implementation of linked lists: inserting, deleting, inverting a linked list.
6. Implementation of stacks & queues using linked lists:
7. Polynomial addition, Polynomial multiplication
8. Sparse Matrices : Multiplication, addition.
9. Recursive and Non Recursive traversal of Trees Threaded binary tree traversal.AVL tree implementation Application of Trees.
10. Application of sorting and searching algorithms Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

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Semester III						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BCA301	Object Oriented Programming	3	0	0	3
2	BCA302	Computer Graphics	3	0	0	3
3	BCA303	Operating Systems	3	0	0	3
4	BCA304	Mathematics for Computing	3	1	0	4
Practical						
1	BCA391	Object Oriented Programming Lab	0	0	4	2
2	BCA392	Computer Graphics Lab	0	0	4	2
3	BCA393	Operating SystemOperating System Lab	0	0	4	2
		Total Credit				19

Course Name: Object Oriented Programming
Course Code: BCA301
Contact: 3L
Credits: 3

Unit I: Object oriented design [5L]

Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Unit II: Object oriented concepts   [4L]

Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism

Unit III: Basic concepts of object oriented programming using Java [5L]

Implementation of Object oriented concepts using Java. Language features to be covered:

Unit IV: Class & Object properties [8L]

Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String [discuss charAt[] , compareTo[], equals[], indexOf[], length[]

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equalsIgnoreCase[], substring[], toCharArray[] , toLowerCase[], toString[], toUpperCase[] , trim[] , valueOf[] methods] & StringBuffer classes [discuss append[], capacity[], charAt[], delete[], deleteCharAt[], ensureCapacity[], getChars[], indexOf[], insert[], length[], setCharAt[], setLength[], substring[], toString[] methods], concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Unit V: Reusability properties [6L]

Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super[ ] method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

Unit VI: Exception handling & Multithreading [6L]

Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, interthread communication, deadlocks for threads, suspending & resuming threads.

Unit VII: Applet Programming [using swing] [5L]

Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint[], getDocumentBase[], getCodeBase[] methods, layout manager [basic concept], creation of buttons [JButton class only] & text fields.

Suggested Books:

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India

2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill

3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – TMH

4. R.K Das – "Core Java For Beginners" – VIKAS PUBLISHING

5. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson

6. Ivor Horton's Beginning Java 2 SDK – Wrox

7. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – TMH

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Course Name: Computer Graphics
Course Code: BCA302
Contact: 3L
Credits: 3

Unit I: Introduction [4L]

Video Display Devices, CRT, LCD display devices Raster-Scan and Random-Scan Systems, Graphics Monitors and Workstations, Input devices, keyboard, mouse, trackball, data glove, scanners and Hard Copy Devices, Graphics Software.

Unit II: Output Primitives [8L]

Line Drawing algorithms [DDA and Bresenham's line drawing algorithm], Circle Generating Algorithms [Bresenham's and midpoint circle drawing algorithm], Ellipse Generating Algorithms [midpoint ellipse drawing algorithm], other curves, Antialiasing and filtering techniques, Filled area primitives.

Unit III: Two Dimensional Geometric Transformations [8L]

Basic transformations [translation, rotation, scaling], Matrix representations and Homogeneous Coordinates, Composite transformations, other transformations, Affine transformation, Transformation between coordinate systems, Two Dimensional Viewing, Window - to - viewport Coordinate transformation.

Unit IV: Clipping Operations [6L]

Line clipping [Cohen - Sutherland algorithm], clip windows, polygon clipping with Sutherland Hodgeman algorithm.

Unit V: Three Dimensional Object Representations [6L]

Polygon surfaces, Curves lines and Surfaces, Spline representations, Bezier Curves and Surfaces, B-Spline Curves, Beta Splines.

Unit VI: Three Dimensional Viewing [4L]

Viewing Pipeline, Viewing Coordinates, Transformation from World to Viewing Coordinates, Projections: Parallel Projections, Perspective Projections

Suggested books:

1. D. Hearn and P. Baker, "Computer Graphics", Pearson.
2. James D. Foley, "Computer Graphics: Principles and Practice", Addison-Wesley

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Course Name: Operating Systems
Course Code: BCA303
Contact: 3L
Credits: 3

Unit I: Introduction [3L]

Importance of OS,Basic concepts and terminology,Types of OS,Different views,Journey of a command execution,Design and implementation of OS

Unit II: Process [10L]

Concept and views, OS view of processes, OS services for process management, Scheduling algorithms,Performance evaluation; Inter-process communication and synchronisation, Mutual exclusion, Semaphores, Hardware support for mutual exclusion, Queuing implementation of semaphores, Classical problem of concurrent programming, Critical region and conditional critical region, Monitors, Messages, Deadlocks

Unit III: Resource Manager [8L]

Memory management,File management,Processor management,Device management

Unit IV: Security and related Issues [5L]

Security and protection,Authentication,Protection and access control,Formal models of protection ,Worms and viruses

Unit V: Multiprocessor System [6L]

Multiprocessor system,Classification and types,OS functions and Requirements, Introduction to parallel computing,Multiprocessor interconnection synchronization

Unit VI: Distributed OS [4L]

Introduction   to distributed processing

Suggested Readings:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4. W. Stallings, Operating Systems, Internals & Design Principles , 5th Edition, Prentice Hall of India. 2008.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

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Course Name: Mathematics for Computing
Course Code: BCA304
Contact: 3L+1T
Credits: 4

Unit I: Propositional Logic [8L]
Construction of truth table, Tautology, Contradiction, Contingency, Logical equivalence, Generating functions, Recurrence relations

Unit II: Graph Theory [16L]
Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Bipartite graph, degree of a graph,Theorem on graph,Complement of a graph, Regular graph,Complete graph,Sub- graph, Walks, Paths, Circuits, Hamiltonian and Euler Graph, Cut sets and cut vertices,Adjacency and incidence matrices of a graph,Graph isomorphism, Dijkstra's Algorithm for shortest path problem, Definition and properties of tree, Binary tree, Spanning tree of a graph,Minimal spanning tree, Algorithms:DFS,BFS,Kruskal'sandPrim'salgorithms

Unit III: Probability Theory [10L]
Basics of Probability Theory: Axiomatic definition of probability. Conditional probability, Independent events and related problems, Bay's theorem [Statement only] & its application, One dimensional random variable, Probability
distributions-discrete and continuous, Expectation, Binomial, Poisson, Uniform, Exponential, Normal distributions

Unit IV: Frequency Distribution [6L]
Collection of data, Charts and diagram, Measure of central tendency, Measure of dispersion

Suggested Readings:

1. Discrete Structure & Graph Theory, Rathore,EPH.

2. DiscreteMathematicalStructure,G.S.Rao,NewAgeInternational

3. FundamentalofStatistics,Goon,GuptaandDasgupta

4. MathematicalProbability,Banerjee,DeyandSen,UNDharPvt.Ltd.

5. EngineeringMathematics,Vol.1&2,Sastry,PHI

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Course Name: Object Oriented Programming Lab
Course Code: BCA391
Contact: 4P
Credits: 2

Unit-I: **Introduction to Java**

Week1: basic Java programs with different data types, branching and iterative statements. Compilation and interpretation of Java programs.

Unit-II: **Java class and Objects**
Week2: Java programs with classes and objects. Implementation of Access Control Modifiers in class, programs with command line arguments.
Week3: Java programs with Array and String

Unit-III: **Java class constructors and method overloading**

Week4: Java programs implementing function overloading, constructor and constructor overloading. Java programs with static data members and methods.

Unit-IV: **Inheritance**

Week5: Java programs implementing inheritance by extending classes. Concept of abstract class.

Week6: Java programs implementing inheritance with interfaces

Unit-V: **Threads and Objects**

Week7: Java programs implementing Thread using Thread class and Runnable interface

Week8: Thread continues…

Unit-VI: **Collection framework**

Week9: Java programs with ArrayList, Vector, List, and Map

Week10: Java programs with HashMap, Set, HashSet

Unit-VII: **Java AWT and Applet**

Week11: Java programs with AWT

Week12: Java programs with Applet

Suggested Books:

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – TMH

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Course Name: Computer Graphics Lab
Course Code: BCA392
Contact: 4P
Credits: 2

Unit I: Introduction

Week 1: Introduction to python graphics library.

Unit II: Output Primitives

Week 2: Implementation of DDA line drawing algorithms.

Week 3: Implementation of Bresenham's line drawing algorithms.

Week 4: Implementation of Bresenham's circle drawing algorithm.

Week 5: Implementation of midpoint circle drawing algorithm.

Week 6: Implementation of midpoint ellipse generating algorithms.

Week 7: Implementation of area filling algorithm.

Unit III: Two Dimensional Geometric Transformations

Week 8: Implementation of basic transformations

Week 9: Implementation of basic transformations

Unit IV: Clipping Operations

Week 10: Implementation of Cohen - Sutherland algorithm.

Unit V: Three Dimensional Object Representations

Week 11: Implementation of curves lines and surfaces generating algorithm.

Week 12: Implementation of curves lines and surfaces generating algorithm.

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Course Name: Operating systems Lab
Course Code: BCA393
Contact: 4P
Credits: 2

Unit I : File Management

Week1: File management system calls: program to implement, Create a file, Copy one file to another, linking a file, Delete a file.

Unit II : Directory Management

Week2: Directory management system calls: program to change directory and print its contents.

Unit III : Process Management

Week3: Parent process – Child process Relationship.

Unit IV : IPC Implementation

Week4: Implementing IPC using pipes.

Unit V : Scheduling Algorithm Implementation

Week5: Simulation of scheduling algorithms:

> 1)First Come First Serve

> 2)Shortest Remaining Job First

> 3)Round Robin

> 4)Preemptive Priority Scheduling

Unit VI : Semaphore Implementation

Week6: Implementation of semaphore: program that demonstrates how two processes can share a variable using semaphore.

Week7: Producer – Consumer Problem Using POSIX semaphores

Week8: Dinning Philosopher's problem.

Unit VII : Shell Implementation

Week9: Implementation of shell

Unit VIII : Deadlock Algorithm Implementation

Week10: To implement Banker's algorithm for a multiple resources.

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Unit IX : Shell Programming

Week11: Shell scripts.

Unit X : Implementation of Page Replacement Algorithms

Week12: To study page replacement policies like

　　　1) OPTIMAL

　　　2) LEAST RECENTLY USED (LRU)

　　　3) FIRST-IN-FIRST-OUT

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Semester IV						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BCA401	Database Management System	3	0	0	3
2	BCA402	Design and Analysis of Algorithms	3	0	0	3
3	BCA403	Computer Networking	3	0	0	3
4	BCA404	Numerical Analysis	3	1	0	4
Practical						
1	BCA491	DBMS Lab	0	0	4	2
2	BCA492	Design and Analysis of Algorithms Lab	0	0	4	2
3	BCA493	Computer Networking Lab	0	0	4	2
		Total Credit				19

Course Name: Database Management System
Course Code: BCA401
Contact: 3L
Credits: 3

Unit I: Introduction   [4L]

Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Data Abstraction, Three Schema architecture of DBMS.

Unit II: E-R Model   [6L]

Need for E-R Model, Various steps of database design, Mapping Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity,

Unit III: SQL   [6L]

Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Stored procedures,cursors and triggers.

Unit IV: Relational Model and Relational Database Design   [8L]

Concept of Relational Model, Design Issues, Keys, Closure set, Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multivalued dependencies, 4NF,5NF, Centralized and distributed database.

Unit V: File Organization and Query Optimization   [2L]

Concepts of File and Records, Fixed Length-Variable length Record, Query optimization.

Unit VI: Indexing   [4L]

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Primary, secondary, clustering, Multilevel Indexes.

Unit VII: Transaction Management   **[6L]**

Transaction definition, properties, transaction state diagram, commit and rollback, Concurrency control,lock based protocols,two phase locking, Recovery management.

Suggested books:

1.Database System Concepts Henry F. Korth and Silberschatz Abraham, Mc.Graw Hill.

2.Fundamentals of Database Systems", Ramez Elmasri, Shamkant B.Navathe, Addison Wesley

Course Name: Design and Analysis of Algorithms
Course Code: BCA402
Contact: 3L
Credits: 3

Unit I: Complexity Analysis   **[8L]**

Time and Space Complexity, Different Asymptotic notations big $O, \Omega, \Box$, Little o,,ω and their mathematical significance and proof.

Unit II: Algorithm Design by Divide and Conquer [8L]

Basic concept of divide and conquer, Merge sort, Quick sort ,heap sort and their complexity analysis in best case, worst case and average case.

Unit III: Disjoint Set Data Structure   [8L]

Set Manipulation Algorithm by Union-Find, Union by Rank, Path Compression

Unit IV: Algorithm Design by Greedy Strategy [5L]

Basic concept, Activity Selection Problem, Fractional Knapsack problem, Job sequencing with deadline,Prims, Kruskal.

Unit V: Algorithm Design by Dynamic Programming [6L]

Basic concept, 0/1 Knapsack Problem, Matrix Chain Multiplication, All Pair Shortest Path - Floyd Warshall Algorithm, Dijkstra's.

Unit VI: Algorithm Design by Backtracking [5L]

Basic concept, Use - N-Queen Problem, Graph Coloring Problem, Hamiltonian Path Problem

Suggested books:
1."Fundamentals of Computer Algorithms" E.Horowitz and Sahni
2. "Introduction to Algorithms" T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein

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Course Name: Computer Networking
Course Code: BCA403
Contact: 3L
Credits: 3

Unit I: Introduction [3L]

Introduction to communication systems, Data, signal and Transmission: Analog and Digital, Transmission modes, components, Transmission Impairments, Performance criteria of a communication system. Goals of computer Network, Networks: Classification, Components and Topology, categories of network [LAN, MAN,WAN];Internet: brief history, internet today; Protocols and standards; OSI and TCP/IP model.

Unit II: Data link layer: [6L]

Types of errors, framing [character and bit stuffing], error detection & correction methods; Flow control; Protocols: Stop & wait ARQ

Unit III: Medium access sub layer: [4L]

Point to point protocol, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access

protocols:ALOHA, CSMA,FDMA, TDMA, CDMA; Ethernet

Unit IV: Network layer: [6L]

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address,Routing : techniques,static vs. dynamic routing ,Protocols: IP, IPV6

Unit V: Transport layer: [4L]

Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token buc

ket algorithm, Quality of services [Qos]

Unit VI: Application Layer [5L]

DNS, SMTP, FTP, HTTP & WWW; Security: Cryptography [Public, Private Key based], Digital Signature, Firewalls [technology & applications]

Unit VII: Physical Layer: [4L]

Overview of data[analog & digital], signal[analog &digital], transmission [analog & digital] & transmission media [guided & unguided]; Circuit switching: time division & space division switch, TDM bus; Telephone Network

Unit VIII: Advanced Networking: [4L]

Wireless LAN: IEEE 802.11, blue-tooth technology, wireless sensor networking and routing basics.

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RFID technology

Suggested books:
1. B. A. Forouzan – "Data Communications and Networking [5th Ed.] " – TMH
2. A. S. Tanenbaum – "Computer Networks [4th Ed.]" – Pearson Education/PHI
3. W. Stallings – "Data and Computer Communications [5th Ed.]" – PHI/ Pearson Education

Course Name: Numerical Analysis
Course Code: BCA404
Contact: 3L+1T
Credits: 4

Unit I: [20L]

Numerical errors and their computations, Truncation and rounding-off errors Calculus of differences: Forward, Backward, Shift, Average, Central, Differential and Divided difference operators, Relation between the operators, Problems on missing terms Interpolation: Newton's forward and backward interpolation, Lagrange's interpolation, Newton's divided difference Numerical Integration: General quadrature formula, Trapezoidal rule, Simpson's 1/3rdrule, Expression for corresponding error terms

Unit II: [20L]

Solutions of Nonlinear Equations: Bisection method, Regula–Falsi method, Method of Iteration Newton Raphson method Numerical solution of a system of linear equation Gauss elimination method, LU factorisation method, Gauss Seidel method Numerical solution of ordinary differential equation: Euler's method, Modified Euler's method, Runga-Kutta method, Predictor-Corrector method

Suggested Readings:

1. Introductory Methods of Numerical Analysis,S.S.Sastry,PHI
2. Numerical Methods,Jain,Iyenger & Jain,New Age International Publishers.
3. Numerical Analysis and Computational Procedure,S.A.Mollah,Books & Allied   Pvt.Ltd

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Course Name: Database Management Systems Lab
Course Code: BCA491
Contact: 4P
Credits: 2

Unit-1 : DDL & DML

Week1 : create , alter, drop, truncate, DML- select, update, insert, delete

Unit-2 : Constraints

Week2: primary key, check constraint, unique, foreign key

Unit-3 : Set operations-

Week3: union, intersect, minus

Unit-4 : Joining

Week4: inner join, cross join, outer join, self join

Unit-5 : Aggregate functions

Week5: Aggregate functions- sum, count, avg, max, min, group by and having

Unit-6 : Ordering

Week6: order by clause, ascending and descending

Unit-7 : Views

Week7: Working with Views.

Unit-8 : PL-SQL

Week8: Introduction to PL/SQL blocks, variable declaration, printing output. PL-SQL operators.

Week9 : conditional statements and iterative statements

Week10: stored procedure, parameterized procedure, IN-OUT-INOUT type parameter. Calling a procedure from another procedure.

Week11: working with functions, difference between procedure and function. Limitation of functions.

Week12: working with cursors, triggers.

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Course Name: Design and Analysis of Algorithms Lab
Course Code: BCA492
Contact: 4P
Credits: 2

Unit I: Divide and Conquer

Week 1 : Implement Merge sort, Implement Quicksort.

Week 2 : Find maximum and minimum element from an array of integers using divide and conquer strategy.

Unit II: Greedy Strategy

Week 3 : Implement fractional knapsack,

Week 4: Implement Job sequence with deadline

Week 5: Implement Dijkstra's algorithm,

Week 5: Implement Prim's algorithm

Week 6: Implement Kruskal's algorithm.

Unit III: Dynamic Programming

Week 7-8: Implement Matrix Chain Multiplication

Week 9-10: Implement Floyd Warshall Algorithm

Week 11-12: Implement Dijkstra's Algorithm

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Course Name: Computer Networking Lab
Course Code: BCA493
Contact: 4P
Credits: 2

IPC (Message queue)

• NIC Installation & Configuration (Windows/Linux)

• Familiarization with o Networking cables (CAT5, UTP) o Connectors (RJ45, T-connector)

o Hubs, Switches

• TCP/UDP Socket Programming

 • Multicast & Broadcast Sockets

• Implementation of a Prototype Multithreaded Server

 • Implementation of o Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window)

o Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check)

o Data Link Layer Error Control Mechanism (Selective Repeat, Go Back N)

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Semester V						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BCA501	Internet Technology	3	0	0	3
2	BCA502	Cyber Security	3	1	0	4
3	BCA503	Theory of Computation	3	1	0	4
Practical						
1	BCA591	Internet Technology Lab	0	0	4	2
Sessional						
1	BCA581	Minor Project	0	0	4	6
2	BCA582	Industrial Training				2
		Total Credit				21

Course Name: Internet Technologies
Course Code: BCA501
Contact: 3L
Credits: 3

Unit I: Introduction to Networking   [8L]

Overview of Networking, Intranet, Extranet and Internet, Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP, Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6, Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IPtables, Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast, Electronic Mail

Unit II: Web Programming   [10L]

Introduction to HTML, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Color name, Color value, Image Maps, area, attributes of image area, Extensible Markup Language (XML), CGI Scripts, GET and POST Methods.

Unit III: Server Side Programming and Scripting   [10L]

Basic PHP Programming, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling, JavaScript basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation, Definition of cookies, Create and Store cookie.

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Unit IV: Security Issues   [6L]

Network security techniques, Password and Authentication, VPN, IP Security, security in electronic transaction, Secure Socket Layer(SSL), Secure Shell (SSH), Introduction to Firewall, Packet filtering, Stateful, Application layer, Proxy.

Unit V: Advance Internet Technology   [6L]

Internet Telephony (VoIP), Multimedia Applications, Multimedia over IP: RSVP, RTP, RTCP and RTSP. Streamingmedia, Codec and Plugins, IPTV, Search Engine Optimization, Metadata.

Suggested books:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J.   Akilandeswari, PHI Learning, Delhi,2013.
2. Internetworking   Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning,

Course Name: Cyber Security
Course Code: BCA502
Contact: 3L+1T
Credits: 4

Unit I: Fundamentals [4L]
Fundamentals of data communication and networking, Network Reference Models: OSI and TCP/IP Models, 3 way handshake and TCP flags, Network address translation[NAT] concept, Network Transmission media and network devices Information Security definition, Information security goals[Confidentiality,Integrity and availability]

Unit II: Hacking concepts [6L]
Hacking, Types of Hacking/Hackers, what is Cybercrime, Types of cybercrime, Classifications of Security attacks [Passive Attacks and Active Attacks] Essential Terminology [Threat, Vulnerability, Target of Evaluation, Attack, Exploit]. Concept of ethical hacking, Phase of Ethical Hacking, Hacktivism

Unit III: Cyber Law [4L]
 Cyber terrorism, Cyber laws, What offences are covered under these laws [Hacking, Data theft, Identity theft [including Password Theft], Email spoofing, Sending offensive messages, Voyeurism, Cyberterrorism] Punishment for cyber crime in India

Unit IV: Protocols & Proxy [6L]
Some protocols[HTTP, HTTPS, FTP, SSH, TELNET,SMTP,DNS, POP3, and related ports], proxy concept, different types of proxy [forward and reverse proxy concept], proxy chain

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Unit V: Cryptography and Steganography[3L]
 Basic concepts of Cryptography and Steganography

Unit VI: Malware [3L]
About Malware, Types of Malware [Virus,worm, Trojan horse, spyware, adware, ransomware],
Type of Computer Viruses [File Virus, Boot sector virus, Macro virus, Electronic mail[email] virus,
Multi-variant virus] some indications of a malware attacks, Popular Antivirus programs, basic idea
of how antivirus identifies a virus [Signature-based detection, Heuristics-based detection, Cloud-
based detection] about VirusTotal website

Unit VII: DOS, IDS, IPS [3L]
 Denial of service attack, Distributed Denial of service attack, Intrusion Detection System, snooping,
 Eaves dropping, Key loggers and Firewall, BOTs/BOTNETS, Intrusion Detection System, Intrusion
 Prevention System

Unit VIII: Password [2L]
About Password, Different types of password [Biometric, Pattern based Graphical password,Strong
Password technique, Types of Password attacks

Unit IX: Web Application Based Threats[2L]
Cross-site   scripting,   SQLinjection,Command   injection,Buffer   overload,   Directory
traversal,Phishing scams,Zombies,Drive by downloads

Unit X: Wireless Networking [4L]
 Concept of wireless networking, Wireless standards, Common term used in wireless networking
 [WLAN,Wireless,Wireless Access point, cellular, Attenuation, Antenna ,Microwave, Jamming,
 SSID, Bluetooth, Wi-Fihotspots] What is Wi-Fi, Wireless attacks[WarDriving,WarWalking:
 WarFlying, War Chalking,BlueJacking], How to secure wireless networks

Unit XI: Stay Secure in digital World [3L]
 How to stay secure in digital World, have strong password, encrypt your data, security suit software,
 firewall setup,update os

Suggested Readings:
1. Data   communication   and   Networking   by
   BehrouzA.Forouzan,McGrawHillEducation[India]Pvt Ltd.
2. Certified Ethical Hacker Certification Exam by William Manning
3. Fundamentals of Cyber Security By Mayank Bhushan,BPB Publications

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Course Name: Theory of Computation
Course Code: BCA503
Contact: 3L+1T
Credits: 4

Unit-1 Languages [8L]

Alphabets, string, language, Basic Operations on language, Concatenation, KleeneStar

Unit-2 Finite Automata and Regular Languages [10L]

Regular Expressions, Transition Graphs, Deterministics and non-deterministic finite automata, NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages.

Unit-3 Context free languages [12L]

Context free grammars, parse trees, ambiguities in grammar and languages, Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, normal forms.

Unit-4 Turing Machines and Models of Computations   [10L]

RAM, Turing Machine as a model of computation, Universal Turing Machine, Language acceptability, decidability, halting problem, Recursively enumerable and recursive languages, unsolvability problems.

Suggested books:

1. Daniel I.A.Cohen, Introduction to computer theory, John Wiley,1996

2. Lewis & Papadimitriou, Elements of the theory of computation , PHI 1997.

3. Hoperoft, Aho, Ullman, Introduction to Automata theory, Language & Computation –3 rd Edition, Pearson Education. 2006

4. P. Linz, An Introduction to Formal Language and Automata 4th edition Publication Jones Bartlett, 2006

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Course Name: Internet Technologies Lab
Course Code: BCA591
Contact: 4P
Credits: 2

Unit-I: Introduction to PHP

Week 1: Write PHP program to demonstrate simple task (such as: to display 'hello') and basic PHP Syntax (includes defining variable, constant, data type and basic arithmetic operations with operators).

Week 2:   Write a PHP program to demonstrate condition/decision making and loop statement

Week 3: Write a PHP program to demonstrate mixing of decisions and looping statements with HTML script.

Unit-II: Function and String in PHP

Week 4:   Write a PHP program to demonstrate call by value, call by reference and recursive function.

Week 5:   Write a PHP Program for String Creating and accessing, String Searching & Replacing String, Formatting String and demonstrating String Related Library function

Unit-III: Array in PHP

Week 6:   Write a PHP program for creating index based and associative array. Also demonstrate accessing the array and element looping with Index based array

Week 7:   Write a PHP Program to demonstrate associative array using each () and for each() and few related Library function. Enhance the array program by including decision and loop statement

Unit-IV: Handling Html Form with PHP

Week 7:   Write a PHP Program to demonstrate Capturing Form and to handle Data Dealing with Multi-value field, Match, Search and Split function.

Week 8:   Write a PHP Program for Generating File uploaded form and redirecting a form after submission

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Unit-V: **Handling Html Form with PHP**

Week 9:   Write a PHP Program to demonstrate to handle file & directory, Opening and closing, a file, Copying, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading

Unit-VI: **PHP MySQL Connectivity and Exception handling**

Week 10:   Write a PHP Program to Connect PHP with MySQL Database and Perform basic database operation(DML, like Insert, Delete, Update, Select)

Week11:   Write a PHP Program to demonstrate Setting query parameter, Executing query-Join (Cross joins, Inner joins, Outer Joins, Self joins)

Week12:   Write a PHP Program to demonstrate statement/process like exception and error, Try, catch, throw, Error tracking and debugging

Suggested books:

1. Learning PHP, MySQL, books by 'O' Riley Press
2. Programming   PHP: Creating Dynamic Web Pages Third Edition, by Kevin Tatroe, Peter MacIntyre,   Rasmus   Lerdorf,   'O'   Riley   Press

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Semester VI						
Sl. No.	**Course Code**	**Course Name**	**L**	**T**	**P**	**Credits**
Theory						
1	BCA601	A. Digital Image Processing B. Machine Learning with python C. Advanced DBMS with PL-SQL	3	0	0	3
2	BCA602	A. Cloud Computing B. Artificial Intelligence C. E-Commerce	3	1	0	4
3	BCA603	Values and Ethics in Profession	3	0	0	3
Practical						
1	BCA691 A/B/C	Elective II Lab	0	0	4	2
Sessional						
1	BCA681	Major Project with Viva-Voce				8
		Total Credit				20

Course Name: Cloud Computing
Course Code: BCA602 A
Contact: 3L + 1T
Credits: 4

Unit 1: Definition of Cloud Computing and its Basics [9L]
Definition of Cloud Computing: Defining a Cloud, Cloud Types – NIST model, Cloud Cube model, Deployment models (Public , Private, Hybrid and Community Clouds), Service models – Infrastructure as a Service, Platform as a Service, Software as a Service with examples of services/ service providers, Cloud Reference model. Characteristics of Cloud Computing – a shift in paradigm Benefits and advantages of Cloud Computing

Cloud Architecture: A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients .

Services and Applications by Type IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos PaaS – Basic concept, tools and development environment with examples SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS platform Identity as a Service (IDaaS) Compliance as a Service (CaaS)

Unit 2 : Use of Platforms in Cloud Computing (Lectures : 12)

Virtualization technologies : Types of virtualization (access, application, CPU, storage), Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D) Load Balancing and Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network), Mention of The Google Cloud as an example of use of load balancing Hypervisors: Virtual machine technology and types, VMware vSphere Machine Imaging (including mention of Open Virtualization Format – OVF) Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance

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Definition of services, Distinction between SaaS and PaaS (knowledge of Salesforce.com and Force.com), Application development Use of PaaS Application frameworks.

Discussion of Google Applications Portfolio – Indexed search, Dark Web, Aggregation and disintermediation, Productivity applications and service, Adwords, Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engine service.

Amazon Web Service components and services: Amazon Elastic Cloud, Amazon Simple Storage system, Amazon Elastic Block Store, Amazon SimpleDB and Relational Database Service

Windows Azure platform: Microsoft's approach, architecture, and main elements, overview of Windows Azure AppFabric, Content Delivery Network, SQL Azure, and Windows Live services

Unit 3 : Cloud Infrastructure [7L]

Cloud Management : An overview of the features of network management systems and a brief introduction of related products from large cloud vendors, Monitoring of an entire cloud computing deployment stack – an overview with mention of some products, Lifecycle management of cloud services (six stages of lifecycle)

Concepts of Cloud Security Cloud security concerns, Security boundary, Security service boundary Overview of security mapping Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance Identity management (awareness of Identity protocol standards)

Unit 4 : Concepts of Services and Applications [8L]

Service Oriented Architecture: Basic concepts of message-based transactions, Protocol stack for an SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs

Applications in the Cloud: Concepts of cloud transactions, functionality mapping, Application attributes, Cloud service attributes, System abstraction and Cloud Bursting, Applications and Cloud APIs

Cloud-based Storage: Cloud storage definition – Manned and Unmanned

Webmail Services: Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo mail, concepts of Syndication services

Suggested Books:

1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd, 2013

2. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, McGraw Hill Education (India) Private Limited, 2013

3. Cloud computing: A practical approach, Anthony T. Velte, Tata Mcgraw-Hill 4. Cloud Computing, Miller, Pearson 5. Building applications in cloud:Concept, Patterns and Projects, Moyer, Pearson

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Course Name: Artificial Intelligence
Course Code: BCA602 B
Contact: 3L + 1T
Credits: 4

Unit I: Artificial intelligence fundamentals [7L]

A.I. systems integrating approaches and methods.- Advanced search- Constraint satisfaction problems - Knowledge representation and reasoning - Non-standard logics - Uncertain and probabilistic reasoning (Bayesian networks, fuzzy sets).- Foundations of semantic web: semantic networks and description logics. - Rules systems: use and efficient implementation.- Planning systems.

Unit II:Machine learning [7L]

Computational learning tasks for predictions, learning as function approximation, generalization concept. - Linear models and Nearest-Neighbors (learning algorithms and properties, regularization). - Neural Networks (MLP and deep models, SOM). - Probabilistic graphical models. - Principles of learning processes: elements of statistical learning theory, model validation. - Support Vector Machines and kernel-based models. - Introduction to applications and advanced models. Applicative project: implementation and use of ML/NN models with emphasis to the rigorous application of validation techniques.

Unit III: Human language technologies [7L]

Formal and statistical approaches to NLP. Statistical methods: Language Model, Hidden Markov Model, Viterbi Algorithm, Generative vs Discriminative Models Linguistic essentials (tokenization, morphology, PoS, collocations, etc.). Parsing (constituency and dependency parsing).Processing Pipelines. Lexical semantics: corpora, thesauri, gazetteers. Distributional Semantics: Word embeddings, Character embeddings. Deep Learning for natural language.
Applications: Entity recognition, Entity linking, classification, summarization.
Opinion mining, Sentiment Analysis. Question answering, Language inference, Dialogic interfaces. Statistical Machine Translation. NLP libraries: NLTK, Theano, Tensorflow.

Unit IV: Intelligent Systems for Pattern Recognition [7L]

Particular focus will be given to pattern recognition problems and models dealing with sequential and time-series data-Signal processing and time-series analysis-Image processing, filters and visual feature detectors-Bayesian learning and deep learning for machine vision and signal processing-Neural network models for pattern recognition on non-vectorial data (physiological data, sensor streams, etc)-Kernel and adaptive methods for relational data-Pattern recognition applications: machine vision, bio informatics, robotics, medical imaging, etc.-ML and deep learning libraries overview: e.g. scikit-learn, Keras, Theano

Unit V: Smart applications and Robotics [8L]

Common designs for smart applications examples: fuzzy logic in control systems or cloud analysis of field sensors data streams   Make or buy: selecting appropriate procurement strategies example: writing your own RRN architecture vs. using cloud services
Development platforms for smart objects examples: Brillo (IoT devices) or Android TV (Smart TVs)
Development platforms for smart architectures examples: TensorFlow (server-side RNNs), or the Face Recognition API (mobile) Cloud services for smart applications examples: Google Cloud

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Machine Learning API, Google Cloud Vision API, Google Cloud Speech API, or Deploying Deep Neural Networks on Microsoft Azure GPU VMs Deployment and operations examples: cloud hosting vs. device hosting, or harnessing user feedback to drive improvement
Measuring success: methods and metrics examples: defining user engagement and satisfaction metrics, or assessing the naturalness of smart interactions.

Introduction to robotics: main definitions, illustration of application domains-Mechanics and kinematics of the robot-Sensors for robotics-Robot Control-Architectures for controlling behaviour in robots-Robotic Navigation-Tactile Perception in humans and robots-Vision in humans and robots-Analysis of case studies of robotic systems-Project laboratory: student work in the lab with robotic systems

REFERENCES
1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig.
2. "Artificial Intelligence: A New Sythesis" by Nils J Nilsson
3. "Artificial Intelligence" by Negnevitsky
4. Intro. to artificial intelligence" by Akerkar Rajendr
5. A "Artificial Intelligence and Machine Learning" by AnandHareendran S and Vinod Chandra S S

Course Name: e-commerce
Course Code: BCA602 C
Contact: 3L + 1T
Credits: 4

Introduction to E-Commerce [6L]:
Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.
Business to Business E-Commerce [7L]:
Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce.
Legal issues [5L]:
Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.

Security Issues [6L]:
Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security.

Business to Consumer E-Commerce [8L]:
Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.

E-business [7L]:

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Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.

Suggested Books:
1. E-Commerce-Strategy, Technologies & Applications by David Whitley, TMH
2. E-Commerce- The cutting edge of business by Kamlesh K. Bajaj, TMH
3. E-Commerce through ASP by W Clarke- BPB
4. Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS by Mathew Reynolds, Wrox Publishers 5. Global Electronic Commerce- Theory and Case Studies by J. Christopher Westland and Theodore H. K Clark, University Press

Course Name: Digital Image Processing
Course Code: BCA601 A
Contact: 3L
Credits: 3

Unit I: Introduction   [4L]

Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.

Unit II: Digital Image Formation   [6L]

A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.

Unit III: Image Enhancement [8L]

Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, High-boost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.

Unit IV: Image Restoration   [9L]

Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation.

Unit V: Image Segmentation   [9L]

Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection- Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding,; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.

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Suggested books:

1. Gonzalves, "Digital Image Processing" ,Pearson .
2. S.   Sridhar,   Digital   Image   Processing,   Oxford

Course Name: Machine Learning with python
Course Code: BCA601 B
Contact: 3L
Credits: 3

Unit-I [4L]
Introduction: what is ML; Problems, data, and tools; Visualization; Introduction to Python
Linear regression; SSE; gradient descent; closed form; normal equations; features Overfitting and complexity; training, validation, test data, and introduction to python ML processing libraries

Unit II [8L]
 Classification problems; decision boundaries; nearest neighbor methods
 Probability and classification, Bayes optimal decisions Naive Bayes and Gaussian class-conditional distribution
Linear classifiers Bayes' Rule and Naive Bayes Model

Unit III [8L]
 Logistic regression, online gradient descent, Neural Networks Decision tree and Review for Mid-term
 Ensemble methods: Bagging, random forests, boosting A more detailed discussion on Decision Tree and Boosting

Unit IV [6L]
 Unsupervised learning: clustering, k-means, hierarchical agglomeration. Advanced discussion on clustering and EM

Unit V [4L]
 Latent space methods; PCA.
Text representations; naive Bayes and multinomial models; clustering and latent space models.

Unit VI [6L]
VC-dimension, structural risk minimization; margin methods and support vector machines (SVM)
Week 14 Support vector machines and large-margin classifiers Time series; Markov models; autoregressive models.

Suggested Books

1. Understanding Machine Learning: From Theory to Algorithms by Shai Ben-David and Shai Shalev-Shwartz
2. Machine Learning, 1st Edition by Pearson (English, Paperback, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das)

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Course Name: Advanced DBMS with PL-SQL
Course Code: BCA601 C
Contact: 3L
Credits: 3

Unit-1: Query Optimization [6L]

Algorithm for Executing Query Operations: External sorting, Select operation, Join operation, PROJECT and set operation, Aggregate operations, Outer join, Heuristics in Query Optimization, Semantic Query Optimization, Converting Query Tree to Query Evaluation Plan, multiquery optimization and application, Efficient and extensible algorithms for multi-query optimization, execution strategies for SQL sub queries, Query Processing for SQL Updates

Unit-2: Query Execution: [6L]

Introduction to Physical-Query-Plan Operators, One-Pass Algorithms for Database, Operations, Nested-Loop Joins, Two-Pass Algorithms Based on Sorting, Two-Pass, Algorithms Based on Hashing, Index-Based Algorithms, Buffer Management, Parallel Algorithms for Relational Operations, Using Heuristics in Query Optimization, Basic Algorithms for Executing Query Operations.

Unit -III Concurrency Control Serializability: [4L]

Enforcing, Serializability by Locks, Locking Systems With Several, Lock Modes, Architecture for a Locking Scheduler Managing Hierarchies of Database Elements, Concurrency Control by Timestamps, Concurrency Control by Validation, Database recovery management

Unit – IV   Transaction processing: [8L]

Introduction of transaction processing, advantages and disadvantages of transaction processing system, online transaction processing system, serializability and recoverability, view serializability, resolving deadlock, distributed locking. Transaction management in multi-database system, long duration transaction, high-performance transaction system.

Unit –V: Object Oriented DBMS [4L]

Overview of object: oriented paradigm, OODBMS architectural approaches, Object identity, procedures and encapsulation , Object oriented data model: relationship ,identifiers, Basic OODBMS terminology, Inheritance , Basic interface and class structure, Type hierarchies and inheritance, Type extents and persistent programming languages, OODBMS storage issues.

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Unit-VI: DDB: Distributed Database [4L]

Introduction of DDB, DDBMS architectures, Homogeneous and Heterogeneous databases, Distributed data storage, Advantages of Data Distribution, Disadvantages of Data Distribution Distributed transactions, Commit protocols, Availability, Concurrency control & recovery in distributed databases, Directory systems, Data Replication, Data Fragmentation. Distributed database transparency features, distribution transparency.

Unit-VII: Database application: [4L]

Active database: starburst, oracle, DB2, chimera, Applications of active database, design principles for active rules, Temporal database, special, text and multimedia database. Video database management: storage management for video, video preprocessing for content representation and indexing, image and semantic-based query processing, real time buffer management.

Suggested Books

1.Database System Concepts Henry F. Korth and Silberschatz Abraham, Mc.Graw Hill.

2.Fundamentals of Database Systems", Ramez Elmasri, Shamkant B.Navathe, Addison Wesley

3. Distributed Databases: Principles and Systems by Stefano Ceri

Course Name: Values and ethics in profession
Course Code: BCA603
Contact: 3L
Credits: 3

Unit I: Introduction to Ethical Theories [4L]

Consequentialist and Non-consequentialist theories, Hedonism, Utilitarianism, Virtue Ethics, Ethical Relativism, Ethical Naturalism

Unit II: Ethics and Morality [6L]
EthicsandMorals,Ethics in IndianTradition,Building character in workplace, Moral and Ethical Judgement: Cannons of ethics, Ethics of duty, Ethics of responsibility

Unit III: Ethics and Environment [8L]
Rapid technological growth and depletion of resources, Sources of energy, Energy crisis, Reports of Club of Rome, Environmental degradation, Environmental Regulations, Environmental Ethics, Eco-friendly technologies, Sustainable Development, Important and recent national and international conventions on environment, Appropriate Technology Movement of Schumacher: Later developments

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Unit IV: Technology and Developing Nations- Technology transfer [8L]

Problems of technology transfer, Stages of technology transfer, Problems of technology transfer, Technology Impact Assessment, Problems of man machine interaction, Impact of Assembly line, Automation, Corporate Social Responsibility

Unit V: Ethics of Profession [8L]

Attributes of a profession, Science, Technology and Engineering as Knowledge and as Social and Professional Activities, Engineering profession: Ethical issues in engineering practice, Conflicts between business demand and professional ideals, Social and ethical responsibilities of Technologists, Codes of professional ethics,Whistle
  blowing and beyond. Case studies

Unit VI: Profession and Human Values [6L]

Value Crisis in contemporary society, Nature of values: Value Spectrum of a 'good' life,Psychological values: Integrated personality; mental health,Societal values:The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution, Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity

Suggested Readings:
1. Ethics in Mgmt &Indian Ethos,Ghosh,VIKAS
2. Business Ethics, G. Pherwani,EPH.
3. Ethics, Indian Ethos & Mgmt,Balachandran, Raja & Nair, SHROFF Publishers
4. HumanValues,A.N.Tripathi,NewAgeInternational

Course Name: Elective II Lab
Course Code: BCA692 A/B/C
Contact: 4P
Credits: 2

Experiments adhere to the theory syllabus and beyond.