

**Syllabus**  
**of**  
**Bachelor of Computer Applications**  
**(BCA)**

**w.e.f Academic Session 2018-19**



**DEPARTMENT OF COMPUTER SCIENCE**  
**CENTRAL UNIVERSITY OF ORISSA**

**KORAPUT – 764021**

**[www.cuo.ac.in](http://www.cuo.ac.in)**

## **COURSE NUMBERING METHOD**

**BCAXYZ**, where:

**X: Year** (Value is **1** for **first year**, **2** for **second year** and **3** for **third year**)

**Y: Course Type** i.e

**0, 1** for **Core Courses**,

**2** for **LABs**

**3, 4, 5, 6** for **Electives**

**7** for **Generic Electives**

**8** for **Ability Enhancement Course**

**9** for **Skill Enhancement Course**

**Z: Semester** i.e

**Even digits (0, 2, 4, 6, 8)** for **even** semester and **Odd digits (1, 3, 5, 7, 9)** for **odd** semester

Following are number of courses that can be assigned with this Method:

1. **Core Courses:** 10/odd semester/year and 10/even semester/year
2. **Labs and Project:** 5/odd semester/year and 5/even semester/year
3. **Electives:** 20/odd semester/year and 20/even semester/year [electives can be added to the current list in future]
4. **Generic Electives:** 5/odd semester/year and 5/even semester/year
5. **Ability Enhancement Course:** 5/odd semester/year and 5/even semester/year
6. **Skill Enhancement Course:** 5/odd semester/year and 5/even semester/year

## SEMESTER-I

S. No.	Course Code	Subject	Periods			Credit
			L	T	P	
1	BCA171	Mathematics –I	4	1	-	5
2	BCA191	Foundation English- I	3	1	-	4
3	BCA181	Management Concept & Organizational Behavior	3	0	-	3
4	BCA101	Fundamentals of Computers	3	1	-	4
5	BCA103	Digital Electronics	3	1	-	4
6	BCA121	Fundamentals of Computers Lab	-	-	2	1
7	BCA123	Digital Electronics Lab	-	-	2	1
<b>Total</b>			<b>16</b>	<b>4</b>	<b>4</b>	<b>22</b>

## SEMESTER-II

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1	BCA170	Mathematics-II	4	1	-	5
2	BCA190	Foundation English II	3	1	-	4
3	BCA180	Environmental Studies	3	1	-	4
4	BCA100	Programming In C	3	1	-	4
5	BCA102	Computer Organization & Architecture	3	0	-	3
6	BCA120	Communication Skills Lab	-	-	2	1
7	BCA122	C Language Lab	-	-	2	1
<b>Total</b>			<b>16</b>	<b>4</b>	<b>4</b>	<b>22</b>

### SEMESTER-III

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1	BCA271	Mathematics-III	4	1	-	5
2	BCA201	Data Structure Using C	3	1	-	4
3	BCA203	Operating System	3	1	-	4
4	BCA205	Fundamentals Of Database Systems	3	1	-	4
5	BCA207	Web Technology - I	3	0	2	4
6	BCA221	Data Structure Lab Using C	-	-	2	1
7	BCA223	Database Systems Lab	-	-	2	1
<b>Total</b>			<b>16</b>	<b>4</b>	<b>6</b>	<b>23</b>

### SEMESTER-IV

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1	BCA270	Mathematics-IV	4	1	-	5
2	BCA280	Fundamentals Of Accounting	3	0	-	3
3	BCA200	OOPs & C++	3	1	-	4
4	BCA202	Computer Graphics	3	1	-	4
5	BCA204	Software Engineering	3	1	-	4
6	BCA220	OOPs & C++ LAB	-	-	2	1
7	BCA222	Computer Graphics Lab	-	-	2	1
<b>Total</b>			<b>16</b>	<b>4</b>	<b>4</b>	<b>22</b>

### SEMESTER-V

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1.	BCAxyz	Elective-I	3	1	-	4
2.	BCAxyz	Elective-II	3	1	-	4
3.	BCA301	Computer Networks	3	1	-	4
4.	BCA303	VB.Net	3	1	-	4
5	BCA305	Web Technology - II	3	1	-	4
6.	BCA321	VB.Net Lab	-	-	2	1
7.	BCA323	Web Technology – II Lab	-	-	2	1
<b>Total</b>			<b>15</b>	<b>5</b>	<b>4</b>	<b>22</b>

### SEMESTER-VI

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1.	BCA304	Core Java Programming	3	1	-	4
2.	BCA390	Project-II	-	-	28	14
3.	BCA322	Core Java Programming Lab	-	-	2	1
<b>Total</b>			<b>12</b>	<b>4</b>	<b>20</b>	<b>19</b>

### **ELECTIVE-I**

<b>SLNO.</b>	<b>SUBJECT CODE</b>	<b>SUBJECT NAME</b>
1	BCA331	Software Project Management
2	BCA333	Embedded System
3	BCA335	Linux Environment
4	BCA337	E-Commerce
5	BCA339	Data Warehousing and Data Mining
6	BCA341	Parallel Computing
7	BCA343	Big Data Analytics

### **ELECTIVE-II**

<b>SLNO.</b>	<b>SUBJECT CODE</b>	<b>SUBJECT NAME</b>
1	BCA330	Management Information System
2	BCA332	Mobile Computing
3	BCA334	Artificial Intelligence
4	BCA336	Information Security
5	BCA338	Network Programming
6	BCA340	Bio-Informatics
7	BCA342	Cloud Computing

# BCA – Semester I

## Mathematics-I

Course code: BCA171

L-4, T-1, P-0, C-5

### Unit-I:

Introduction to Set Theory and Set operations, Cardinality of the set theory, De-Morgan's Law, Well ordering Principle, Archimedean property, Principal of Mathematics induction, Divisibility of integer, Division algorithms, G.C.D., L.C.M., Euclidian algorithm, Property of Convergence.

### Unit-II:

Relations and Functions: Properties of Relations, Equivalence relation, Equivalence classes, Partial order Relation, Function, Domain range of a function, Injunction, Surjection, Bijection function, Composition and Inverse function, Trigonometric, Logarithmic and Exponential functions, Graph of a function.

### Unit-III:

Limit & Continuity: Introduction, Limit of a function, Left hand & right hand limit of a function, Infinite limits and limit at infinity, Sequence, Subsequence, Convergence of continuity, Limits and Continuity of trigonometric exponential, Logarithmic function.

### Unit-IV:

Differentiation: Introduction, Instantaneous Rate of Change, derivatives, Tangent lines of a graph at a point, Derivative of some standard functions (trigonometric, exponential, logarithmic etc), Algebra of derivatives, Derivative of composite function (the Chain rule), Derivative of inverse function, Method of Differentiation, Successive Differentiation, Applications of Derivative, Mean Value Theorem, Rolles's Theorem.

### Unit-V:

Integration: Introduction, Ant derivative, Simple integration formula, Algebra of Integrals, Integration by Substitution, Integration of some trigonometric functions, Integration by trigonometric substitution, Integration by Partial Fractions & Integration of Rational functions. Definite Integral, Fundamental theorem of Calculus, Properties of Definite Integrals, Area under plane curve.

### Text Books:

1. Engineering Mathematics by Kreyzig.
2. Schaum's Outline of Calculus
3. Schaum's Outline of Advanced Claculus.

### Reference Books:

1. Understanding Mathematics by K.B Sinha, R.L Karandikar, C.Musili, S.Pattanck, D Singh and A Dey. Publisher: University Press (2000).
2. Discrete Mathematics and its Applications by Kenneth H. Rosen. Publisher: McGraw Hill Education (6th Edition).

# BCA - Semester I

## FOUNDATION ENGLISH- I

Course code: BCA191

L-3, T-1, P-0, C-4

**Objective:** This syllabus has been designed to improve the oral and written communication skills of students.

Course Contents **Unit – I**

**Functional Grammar:** Patterns & Parts of speech Subject, Predicate, Noun, Pronoun, Adjective, Adverb, Verb, Verb phrases, Conjunction, Interjection.

**Unit - II**

**Vocabulary:** Word formation, Prefix, Suffix, Compound words, Conversion, Synonyms, Antonyms, Homophones and Homonyms, How to look up a dictionary.

**Unit – III**

**Sentence Structure** - Tense Pattern – usage of Tenses

**Communication:** Meaning & importance of communication, Barriers to effective communication, Channels of communication, Language as a tool of communication.

**Unit – IV**

Sounds of English

**Unit – V**

Conversation: Extempore speech and Declamation, Reading skill, Comprehension Test, Précis Writing.

**Text Books:**

Monippally , Matthukutty - Business Communication: From Principles To Practice-Tata Mc Graw Hill Education,2013.

Hewings, Martin - Advanced Grammar-Cambridge University Press, 2012.

**Reference Books:**

Raman Meenakshi & Sharma Sangeeta, Technical Communication-Principles & Practice – O.U.P. New Delhi. 2007.

Living English Structure, William Stannard Allen, Longman Publisher

English Errors of Indian Students, Oxford University Press, New Delhi.

Advanced Learner’s Dictionary, O.U.P

Latest editions of all the suggested books are recommended



# **BCA- Semester I**

## **MANAGEMENT CONCEPT & ORGANIZATIONAL BEHAVIOR**

**Course Code: BCA181**

**L-3, T-0, P-0, C-3**

### **Objective:**

The objectives of this subject are to enable

- to describe the nature and scope of management;
- to know the difference between management and administration;
- to understand the concepts of organizational behavior and its application in managing people

### **Course Contents**

#### **Unit I**

Introduction to Management: Meaning, nature and importance of management; Management functions; Management skills; Classical theories of management.

#### **Unit II**

Planning: Importance of planning; Types of plans; Planning and decision making process. Process of organizing; Organizational structure and design.

#### **Unit III**

Organizational Behavior: introduction to organizational behavior in management; Foundations of individual behavior-personality; Concept of perception & perception theories

#### **Unit IV**

Concept of learning with theories, Concept of attitudes, Job design & job satisfaction. Concept of motivation with theories.

#### **Unit V**

Group: Foundations of group behavior; Leadership: power and politics. Organizational culture: Meaning, importance and characteristics of organization culture.

### **Text Books:**

1. Newstrom, John W. and Keith Davis, Organizational behavior: Human Behavior at Work, Tata McGraw-Hill, New Delhi, 1997.
2. Sharma, R.A., Organizational Theory and Behavior, Tata McGraw -Hill, New Delhi.
3. Prasad L.M., Principles and Practice of Management, Sultan Chand
4. Murugan and Shaktivel, Management Principles and Practices, New Age

**Reference Books:**

1. Koontz, Harold, Cyril 'O' Donnell, And Heinz Weihrich, Essentials of Management, Fourth Edition, McGraw-Hill, Singapore.
2. Robbins, Stephen P. and Mary Coutler, Management, 5th ed., Prentice Hall of India Private Ltd., New Delhi.
3. Rendolph, Bobbitt, H., Organizational Behavior, 7th ed., Prentice Hall, New Jersey.
4. Srivastava & Chunawalla, Management Principles and Practices, Macmillan
5. Koontz, Principles of Management, Tata McGraw Hill, 2008

\*Latest editions of all the suggested books are recommended.

# **BCA - Semester I**

## **FUNDAMENTALS OF COMPUTERS**

**Course Code: BCA101**

L-3, T-1, P-0, C-4

**Objective:** To give the basic knowledge of Computer hardware and application software to the students.

### **Course Contents**

#### **Unit-I**

Computer Basics: Introduction and definition of computer, Computer Generations, Characteristics of Computer, Advantages and Limitations of computer, Classification of computers, Functional components of a computer system. Types of Computer Software – System software, Application software, Utility software, Virus, features, types of viruses, virus detection prevention and cure. MS-DOS: Operating System, Basic Concepts of Operating System (DOS, WINDOWS, UNIX, LINUX, ANDROID)

#### **Unit-II**

Computer Languages: Introduction to languages, Compiler, Interpreter and Assembler, High Level Language to Machine Language Conversion , Evolution of programming language, Classification of Programming Languages, Features of a good Programming Language, Example of High Level Languages, Characteristics of a good language Number system: Binary number system, Octal & Hexa-decimal number system

#### **Unit-III**

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation, Techniques of Problem Solving: Algorithm and Flowcharts Algorithm: Definition, Characteristics, Advantages and disadvantages, Examples Flowchart, pseudo code, decision table, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

#### **Unit-IV**

Introduction of Internet: Basic elements of a communication system, data transmission modes, Types of Networks-LAN, WAN, MAN, Topologies of LAN (ring, bus, star, mesh and tree).  
Web Browsers, Searching, Surfing, Creating E-Mail account, sending and receiving E-Mails.

#### **Unit-V**

Introduction about Operating System, Process, Multiprogramming, Multiprocessor Basic concepts on DBMS, Advantages DBMS over traditional File processing System, Advantages & Disadvantages of DBMS, E-R diagram, File :- Attributes, Operations, Type, Access Methods

**Text Books:**

1. Sinha P.K., Computer Fundamentals, BPB Publishing.
2. O’Leary Timothy, O’Leary Linda , Microsoft Office 2007, TMH Publication
- 3 Rajaraman, V., “Fundamental of Computers”. Prentice Hall India, New Delhi

**Reference Books:**

1. Leon A. & Leon M., Introductions to Computers, Vikas Publication.
2. Balagurusamy E., Programming in ANSI C, TMH Publication.
3. Norton Peter, Introductions to Computers, TMH Publication.
4. Price Michael, Office 2010 in Easy Steps, TMH Publication.

\*Latest editions of all the suggested books are recommended

# BCA - Semester I

## DIGITAL ELECTRONICS

Course Code: BCA103

L-3, T-1, P-0,C-4

**Objective:** This subject provides students an in–depth theoretical base of the Digital Electronics, the fundamental designing concepts of different types of Logic Gates, Minimization techniques and the computational details for Digital Circuits.

### Course Contents

#### Unit - I

**Number systems :** Binary number system, Octal & Hexa-decimal number system, Conversion of Number System, r's & (r-1)'s, Binary arithmetic Operations, complement weighted & unweighted codes (BCD,Excess-3,Gray code).

#### Unit - II

**Logic Gates:** AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates.

**Boolean algebra:** AND, OR, Inversion, Basic Boolean Law's, Demorgan's theorem, Minimization techniques: K -Map, Sum of Product & Product of Sum.

#### Unit III

**Combinational circuits:** Multiplexers, Demultiplexers, Decoders & Encoders, Half Adder, Full Adder, Half Subtractor, Full Subtractor.

#### Unit -IV

**Sequential Circuits:** Flip Flop, Types of Flip Flop: R-S, D, J-K, T, Master Slave, and State Realization of one Flip Flop Using Other Flip Flop.

#### Unit V

**Registers and Counters:** Shift Registers, Types of registers, Universal Shift Register with parallel load, Bi-directional Shift register.

#### Text Book:

1. Morris Mano, *Digital Logic*, Prentice Hall of India.

#### Reference Books:

2. Taub & Schelling, *Digital Integrated Electronics*, McGraw-Hill International Edition
3. Charles H.Roth, Jr. *Fundamentals of Logic Design*, Jaico Publishing House, 2000.
4. Donald D.Givone, *Digital Principles and Design*, Tata McGraw-Hill, 2003.
5. Bartee, *Digital Computer Fundamentals*.

\*Latest editions of all the suggested books are recommended.

# **BCA - Semester I**

## **FUNDAMENTALS OF COMPUTERS LAB**

**Course Code: BCA121**

**L-0, T-0, P-2, C-1**

### **Course Contents**

**Introduction to Windows:** Windows features including Control Panel and it's Components, Graphical features, Desktop setting with screensaver and wallpaper, Color, Background, Cut, Copy, Paste, Creating folder.

#### **MS-WORD**

**Creating, Editing, Formatting:** Font name, size, color, alignment, changing paragraph settings, Using Word Art ,Hyperlink, change case, spell checker, Mail Marge, Creating Tables, editing tables, alignment settings in tables

#### **MS-EXCEL**

**Creating, Editing, Formatting:** Font name, size, color, alignment, entering data, sorting data, Inserting, renaming and deleting Sheet, Inserting row, column, cell, picture, background, graph, symbol, applying formula in a cell, Call by Value, Call by Reference, hyperlink, object, diagram, Macro.

#### **MS-POWERPOINT**

**Creating, Editing, Formatting:** Font name, size, color, alignment, changing, Inserting table, picture, background, graph, symbol, hyperlink, object, and diagram, Slide Layout, Slide Design, Slide Show, Slide Sorter View, Slide Transition, Custom Animation, Inserting Sound and Movies in a Slide.

#### **MS-ACCESS**

Creating and editing Database using Table, Query, Report and Form.

#### **Introduction to Internet**

Web Browser, Search Engine, Creating E-Mail account, Attaching documents, Sending and Receiving E-Mails

# BCA - Semester I

## DIGITAL ELECTRONICS LAB

**Course Code: BCA123**

**L-0, T-0, P-2, C-1**

### **Course Contents**

- 1) To study AND gate.
- 2) To study OR gate.
- 3) To study NOT gate.
- 4) To study NOR gate.
- 5) TO study NAND gate.
- 6) To study XOR gate.
- 7) To study NAND using AND and NOT.
- 8) To study NOR using OR and NOT.
- 9) Give truth table of  $AB+C'$ .and verify it.
- 10) Give truth table of  $A'B+C'$  and verify it.
- 11) To study XOR using AND , OR and NOT.
- 12) To study XOR using NAND Gates.
- 13) To study XNOR gate.
- 14) To study XNOR using AND,OR,NOT gates.
- 15) To study XNOR using NOR gates.
- 16) To study XNOR using NAND gates.
- 17) To study NOR using NAND.
- 18) To study AND using NAND.
- 19) To study OR using NAND.
- 20) To study OR using NOR.
- 21) To study AND using NOR.
- 22) To study NAND using NOR.
- 23) To study XOR using NOR.
- 24) To study NOT using NAND.
- 25) To study NOT using NOR.
- 26) Give truth table of  $(A'B)'+C$ .and verify it.
- 27) Give truth table of  $(A+AB')C'$ .and verify it.
- 28) Give truth table of  $AB+BC'$ .and verify it.
- 29) State and Prove Consensus Theorem using truth table.
- 30) State and Prove DeMorgan's Theorem Theorem using truth table.
- 31) To study Half Adder.
- 32) To study Full Adder.
- 33) To study HalfSubtractor.
- 34) To study Full Subtractor.
- 35) To study RS flip-flop using NOR gate.
- 36) To study D-type flip-flop using NAND gate.
- 37) To study JK flip flop using NOR gate.
- 38) To study T flip flop using NAND gate.
- 39) To study the 2 to 4 decoder.
- 40) To study decoder of Binary to Decimal.

**SEMESTER-II**

<b>S.No.</b>	<b>Course Code</b>	<b>Subject</b>	<b>Periods</b>			<b>Credit</b>
			<b>L</b>	<b>T</b>	<b>P</b>	
1	BCA170	Mathematics-II	4	1	-	5
2	BCA190	Foundation English II	3	1	-	4
3	BCA180	Environmental Studies	3	1	-	4
4	BCA100	Programming In C	3	1	-	4
5	BCA102	Computer Organization & Architecture	3	0	-	3
6	BCA120	Communication Skills Lab	-	-	2	1
7	BCA122	C Language Lab	-	-	2	1
<b>Total</b>			<b>16</b>	<b>4</b>	<b>4</b>	<b>22</b>



# BCA - Semester II

## MATHEMATICS-II

Course Code: BCA170

L-4, T-1, P-0, C-5

### Course Contents

#### Unit-I:

System of Linear equations, Matrices, Matrix Operation (Addition, Scalar Multiplication, Multiplication, Transpose, Ad joint & their properties), Special type of Matrix, elementary row operations, Row reduced echelon form of matrices, Elementary matrices, Determinant, Cofactor and minors of matrix, Complementary minor, Inverse of a matrix, Cramer's rule, Solution of a System of linear equations,  $Ax=b$ , using Cramer's rule, Gauss elimination method and Inverse matrix method.

#### Unit-II:

Method of mathematical proofs(Induction, Contraction, Contradiction, Contra positive) Logic: Introduction, Propositions, Truth tables, tautology, Negation, Conjunction, Disjunction, Implications, Biconditional propositions, Converse, Contra positive and inverse propositions and precedence of logical operators.

#### Unit-III:

Polynomials with real coefficients, Fundamental theorem of Algebra(Statement), Nature of roots of an equations, (Surd or complex roots occur in pairs). Statements of Descartes rule of signs and of Storm's theorem and their applications, Multiple roots, Relation between roots and coefficients, Symmetric functions of roots.

#### Unit-IV:

Graph theory, Representation of Graphs, DFS, BFS, Spanning trees, Planar Graphs, Applications of graphs, Isomorphism of graphs, Sub graphs, Multi graphs and Euler Circuits, Hamiltonian Graphs, Chromatic numbers.

#### Unit-V:

Partial Order Relations & Lattices, Partial order sets, Representation of POSETs using Hasse diagram, Chains, Maximal & minimal point, glb, lnb, Lattices and Algebraic System, Principle of Duality, Basic properties, Sub lattices, Distributed and Complemented Lattices.

### Text Books:

1. Discrete mathematics for computer scientists and mathematics- Joe L. Matt, A. Kandel, Theodore Bakes
2. Discrete Mathematics by Keaneth Rosen
3. Discrete Mathematics :Keneath Ross, Charles P.B. Wright.

### Reference Books:

1. Understanding Mathematics by K.B Sinha, R.L Karandikar, C.Musili, S.Pattanck, D Singh and A Dey. Publisher: University Press (2000).
2. Elements of Mathematics (Vol-I, II) published by Odisha State Bureau of text book preparation & Production, Pustak Bhavan, BBSR.
3. Higher Algebra by Hall & Knight.

# BCA - Semester II

## FOUNDATION ENGLISH II

Course code: BCA190

L-3, T-1, P-0, C-4

### UNIT-I

#### Communication:

1. Meaning, Types & importance of communication, Barriers to effective communication, Channels of communication, Language as a tool of communication, Non-verbal Communication, Models of Communication.
2. Oral, aural, reading and writing - vocabulary – clarity of voice, tone and pitch in communication
  1. **Introduction to Communication Skills:** Verbal and Non-Verbal Skills
  2. **Diction I and Diction II:** Correctness and Appropriateness and Effectiveness

### UNIT-II

1. The art of Composition
2. Revision of Tenses
3. Formation of correct sentences
4. Avoiding ambiguity and idiomatic distortions
  1. **Syntax:** Incorrect and Awkward Sentences, Agreement and Consistency
  2. The Art of Composition I and The Art of Composition II

### UNIT-III

1. **Professional Written Communication I:** Abstracts, Letters, Memos, Resumes  
Email, Fax, Reports, synopsis, thesis
2. **Professional Written Communication II:** Technical Writing, Nature, Origin and Development, Salient features, Scope & Significance, Forms of Technical Communication, Difference between Technical communication & General writing, Objective Style vs. Literary Composition.

### UNIT-IV

1. Oral Presentations, Group Discussions, Interview, Notices, Agendas and Minutes, Business Correspondence
2. Interview and Interviewing Skills, Speeches, Presentations, Meetings

### UNIT-V

Vocabulary Development, Editing Skills, Reference Skills, Information Transfer

**Text-Books:**

1. Murphy, Raymond- English Grammar- Cambridge University Press, 2012
2. Raman Meenakshi & Sharma Sangeeta, Technical Communication-Principles & Practice O.U.P. New Delhi. 2007.
3. Mitra Barum K., Effective Technical Communication – O.U.P. New Delhi. 2006.
4. Better Your English- A Workbook for 1<sup>st</sup> year Students- Macmillan India, New Delhi.

**Reference Books:**

1. Horn A.S., Guide to Patterns & Usage in English – O.U.P. New Delhi.
2. Mohan Krishna & Banerji Meera, Developing Communication Skills – Macmillan India Ltd., Delhi.

# BCA - Semester II

## ENVIRONMENTAL STUDIES

Course Code: BCA180

L-3, T-1, P-0, C-4

### Objective:

The objectives of this subject are

- To locate and comprehend relationships between the natural, social and cultural environment;
- To develop an understanding based on observation and illustration, drawn from lived experiences;
- To develop an awareness about environmental issues.

### Course Contents

#### Unit – I

Basic Concepts of Environmental studies: Definitions: the Environment-Air, Water and Land, Ecology, Ecosystem, Environmental factors (Abiotic factors-light, temperature, soil water and air and biotic factors) Limiting factors, Ecological adaptations.

#### Unit – II

Ecosystem functioning, (Preliminary concept & structure) structure and its organisation, Ecological energetic, Energy flow, food chains, food web, Ecological pyramids, production-Bio-geo-chemical cycles (Hydrologic cycle (water), Gaseous cycle (Oxygen & Co<sub>2</sub>), Sedimentary cycle (Nitrogen and Sulphur)

#### Unit – III

Population density Natality, mortality, carrying capacity, Age population growth curves, community structure, Ecological succession, types of succession, succession patterns, theories of climax community, Biodiversity.

#### Unit – IV

Environmental Pollution: Air pollution, water pollution, terrestrial pollution, Noise pollution, Radiation Pollution, Industrial pollution, Sewage and sewage treatment. Types of pollutants, sources and fate of pollutants in the environment, Depletion of Ozone layer, Green House effects, smog, Acid rain, Biological concentration and biomagnifications of pollutants.

#### Unit – V

Conservation of natural resources: Types of renewable and non-renewable resources, oil erosion and conservation, Forest conservation, Deforestation, Afforestation, social forestry, photo geographical regions of India, Management and conservation of Wild life, Pollution control Board and their functions. Environmental awareness and Education.

**Text Book:-**

Ashok k Panigrahi, Alaka Sahu, “Environmental Studies”, Sadgrantha Mandir, Berhampur

**References:**

1. B.P. Odum, “Fundamental of Ecology” W. B. Saunders Company Philadelphia, London.
2. M. C. Dash, “Fundamentals of Ecology”, Tata Mc Graw Hill publishing Company Limited, New Delhi
3. P. C. Mishra , “Fundamentals of Air and Water Pollution” Ashis publishing House, New Delhi
4. B. N. Mishra, M. K. Mishra , “Introductory practical Biostatistics” N. P. Publishers, Calcutta
5. Dr. Ranganath Mishra, “Paribasa Bigiana (odia)”
6. Dr. Basanta Ku Mahapatra , “Paribasa o Paribasa Bigiana (odia)”
7. Dr. Ranganath Mishra , “Concept of Env. Studies”
8. Dr. N. K. Tripathy, “Fundamental of Env. Studies”
9. Dr. M. C. Dash, “Man and Environment”

# BCA - Semester II

## PROGRAMMING IN 'C'

Course Code: BCA100

L-3, T-1, P-0, C-4

**Objective:** The objective of this course module is to provide the sound knowledge of C programming. It facilitates the student to develop programming capability to design programs as well as real life applications using C language. It also cover the concept of core programming like how to implement functions ,arrays and how to manage data in files using different operations.

### Course Contents

#### Unit - I

**Concept of C programming:** History, Introduction of C programming language, Structure of C program, C character set, Data types, Variables, Constants, Keywords and Identifiers, Expression statements in C language, Operators (Arithmetic, Logical, Relational, Assignment etc.).

#### Unit – II

**Conditional Program:** Execution, IF statement, IF.....ELSE statements nested IF.....ELSE and ELSE IF ladder. Program Loops and Iteration, WHILE loop, DO loop and FOR loop, Nested Loops, Use of break, continue and GOTO statements, Switch statement, use of break and default with switch, Storage Class in C language.

#### Unit – III

**Functions:** Built-In and User Defined functions, Function Declaration, Definition and Function Calling, Parameter Passing (Call by Value and Call by Reference), Recursion, Pointers, Macros.

#### Unit - IV

**Arrays:** Definition of array, declaration, Linear Arrays, Multidimensional Arrays, Passing Array to function, String, string handling functions, Dynamic Memory Allocation.

#### Unit - V

**Structure and Union:** Definition, Programs using Structure and Union, Difference between Structure and Union.

**File Handling:** Opening and Closing data files, Read and Write Functions, different modes of files.

**Text Books:**

1. BalaguruswamyE., *Programming in ANSI C*, TMH
2. Kanitkar Yashwant, *Let Us C*, BPB
3. Kanitkar Yashwant, *Working With C*, BPB

**References Books:**

1. Brian W. Kernighan and Dennis M. Ritchi, PHI
2. Shaum's Series *Programming in C*, TMH
3. Forouzan, *Computer Science*, Thomson, Cengage

\*Latest editions of all the suggested books are recommended.

# **BCA - Semester II**

## **COMPUTER ORGANIZATION AND ARCHITECTURE**

**Course Code: BCA102**

**L-3, T-0, P-0, C-3**

### **Objective:**

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory

### **Course Contents**

#### **Unit - I**

**Basic Building Blocks:** Half Adder, Full Adder, Half Subtractor, Full Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer, Registers, Registers with parallel load

#### **Unit - II**

**Register Transfer Language:** Bus and Memory Transfer, Three State Bus Buffers, Memory Transfer, Arithmetic Micro operation(Binary Adder, Binary Adder-Subtractor, Binary Increment, Arithmetic Circuit), Logic Micro operations(List of logic operation), Shift Micro operations, Arithmetic Logic Shift Unit.

#### **Unit – III**

**Memory Organization:** Memory Hierarchy, Main Memory: RAM & ROM chips, Memory Address Map, Cache memory, Virtual Memory, page replacement schemes

#### **Unit – IV**

**Processor Organization:** General register organization, Stack organization, Reverse Polish Notation, addressing mode, Instruction type.

#### **Unit – V**

**Input-Output Organization:** I/O Interface, I/O bus and interface modules, Strobe control, Hand Shaking, DMA, Interrupts & Interrupt handling, Direct Memory access: DMA Controller and DMA Transfer.



**Text Books:**

1. Mano M., *Computer System Architecture*, Prentice Hall of India.
2. Subrata Ghoshal, *Computer Architecture and Organization*, PEARSON

**Reference Books:**

1. Vravice, Zaky & Hamacher, *Computer Organization*, Tata McGraw Hill
2. Tannenbaum, *Structured Computer Organization*, Prentice Hall of India.
3. Hayes John P., *Computer Organization*, McGraw Hill.

\*Latest editions of all the suggested books are recommended.

# **BCA - Semester II**

## **COMMUNICATION SKILLS LAB**

**Course Code: BCA120**

**L-0, T-0, P-2, C-1**

### **Course Contents**

1. Gaining entry into an organization
  - i. Preparing job-applications and CVs
  - ii. Facing an interview
  - iii. Participating in group discussion (as part of the recruitment process)
2. In-house communication
3. Superior/senior-subordinate/junior (individual/group)
  - i. Welcoming new entrants to the organization, introducing the workplace culture etc.
  - ii. Briefing subordinates/ juniors: explaining, duties and responsibilities etc.
  - iii. Motivating subordinates/ juniors
  - iv. Expressing/ recording appreciation, praising/ rewarding a subordinate or junior
  - v. Reprimanding/ correcting/ disciplining a subordinate/ junior (for a lapse); asking for an explanation etc.
4. Subordinate/ junior (junior/senior)
  - i. Responding to the above
  - ii. Reporting problems/difficulties/ deficiencies
  - iii. Offering suggestions

# BCA - Semester II

## C LANGUAGE LAB

Course Code: BCA122

L-0, T-0, P-2, C-1

### Course Contents

1. Given the values of the variables x, y and z, write a program to rotate their values such that x has the value of y, y has the value of z, and z has the value of x
2. Write a program that reads a floating point number and then displays the right-most digit of the integral part of the number.
3. The distance between two cities (in Km) is input through the keyboard. Write a C program to convert and print this distance in meter, feet, inches and centimeter.
4. If a five-digit number is input through the keyboard, write a C program to calculate the sum of its digits without using loop.
5. If a four-digit number is input through the keyboard, write a C program to obtain the sum of the first and last digit of this number.
6. Program to find largest and smallest number from four given number.
7. Program to find whether a year is leap or not.
8. Program to find out the grade of a student when the marks of 5 subjects are given. The method of assigning grade is as—

Per $\geq$ 85	Division=First	grade=A+
Per < 85 and Per $\geq$ 70	Division=First	grade=A
Per < 70 and Per $\geq$ 60	Division=Firs	grade=B+
Per < 60 and Per $\geq$ 50	Division=Second	grade=B

Per < 50 and Per >= 40  
Per < 40

Division=Third  
Division=Fail

grade=C  
grade= Fail

9. A library charges a fine for every book returned late. For first 5 days the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to access the number of days the member is late to return the book and display the fine or the appropriate message.

10. Write a C program in which enter any number by the user and perform the operation of product of digits of entered number.

11. Write a C program in which enter any number by the user and perform the operation of Sum of digits of entered number.

12. Write a C Program to convert Decimal number to Binary number.

13. Find the sum of this series upto n terms  
1+2+4+7+11+16+.....

14. Program to print Armstrong's numbers from 1 to 10000.

15. Program to find the sum of digits of a number until the sum is reduced to 1 digit.  
For example: 538769 → 38 → 11 → 2

16. Write a program to convert years into

1. Minute
2. Hours
3. Days
4. Months
5. Seconds

Using switch () statements.

17. Write a C menu driven program that will perform the following operation.

- 1) Generate Fibonacci series as per given range which is entered by the user.
- 2) Print all the prime number between 1 to 300.
- 3) Exit

18. Write a C Program that will perform the logic of Perfect number.

19. Write a program to generate the following pattern –

(i).

```
A   B   C   D   C   B   A
A   B   C           C   B   A
A   B                   B   A
A
```

(ii).

```
      1
     1 1
    1 2 1
   1 3 3 1
  1 4 6 4 1
 1 5 10 10 5 1
```

20. Write a currency program, which tells you how much numbers of 100, 50,20,10,5,2 and 1 Rs notes will be needed for a given amount of money. For example if the total amount is Rs. 545 then five 100 Rs. notes, two 20 Rs. Notes and one 5 Rs. Note will be needed.

### Programs related to function:

1. Write a C program to perform the factorial of given number.
2. Write a C program that input numbers and display one of the following as per the desire of the

user:

- (a) Sum of the numbers
- (b) Difference of the numbers
- (c) Product of the numbers
- (d) Division of the numbers
- (e) Exit

Provide separate functions for performing various tasks as Calculating.

Write a C program to find the sum of the following series using function.

$$X - X^3/3! + X^5/5! - X^7/7! \dots\dots$$

3. Write a C program in which a function prime that returns 1 if its argument is a prime and return zero otherwise.
4. Write a C program to perform the operation of nPr and operation of nCr using separate function.
5. A positive integer is entered through the keyboard. Write a function to obtain the prime factors of this number.
6. Write a C program using function that find out the 4th bit of given number is on or off.

**Program related to Recursion:**

1. Write a C program to calculate factorial of a number using recursion. Number being entered by user.
2. Write a C program to generate Fibonacci series using recursion. The user enters the limit of series.
3. Write a C Program to print the reverse of an integer number entered by user

**Program related to Array:**

1. Write a C program to count the number of positive, negative and zero number in the given list of numbers.
2. Write a C program for swapping of two arrays as per indexes accordingly both array have the same size.

3. Write a C program in which enter 10 elements by the user and perform the operation of sorting in ascending order.
4. WAP to enter an integer array of size 10 and perform following operations on it.
  - a) Display the Elements.
  - b) Calculate the Sum and Average of Array.
  - c) Find largest element.
  - d) Find second largest element.
  - e) Find the Smallest element.
  - f) Display the Array in Reverse order.
  - g) Exit
5. Write a C program to perform following operation on it.
  - a. Generate  $n * n$  Matrix.
  - b. Display  $n * n$  Matrix.
  - c. Perform operation of Addition in two  $n * n$  Matrix.
  - d. Perform operation of Subtraction in two  $n * n$  Matrix.
  - e. Perform operation of Multiplication in two  $n * n$  Matrix.
  - f. ExitForm perform every option generate a separate function.

2. Write a C program to perform following operation on it.
  1. Generate  $n * n$  Matrix.
  2. Display  $n * n$  Matrix.
  3. Perform operation of transpose of an  $n * n$  Matrix.
  4. Perform operation of sum of diagonal element of an  $n * n$  Matrix.
  5. Exit

Form perform every option generate a separate function.

3. Write a program to search a given element in an Array using function if the element found then returns its position.

**Programs related to String and Pointer:**

1. Write a program to read a name through the keyboard. Determine the length of the string and find its equivalent ASCII codes.
2. Write a program to remove the Occurrences of “The” word from entered text.

3. Write a program to delete all the occurrences of the vowels in a given text. Assume that the text length will be of one line.
4. Write a program to copy the content of one string into another string using pointer and function.
5. Write a program to find that two strings are identical or not using pointer and function.

**Programs related to Structure and Union:**

1. Suppose you need to generate a result table which consists of student id, student name, marks of three subject and total marks. Write a program which takes input for ten students and displays result table. Also display student information separately who got the highest total. USE STRUCTURES.
2. Suppose you need to store information of 10 persons. Information includes name and age. But criteria is: for the child age should be in form of full birth date, for an adult the age should be in years only, while for aged person store age indicating the status 'O'. Use union for memory efficiency.
3. Write a program to maintain the library record for 100 books with book name, author's name, and edition, year of publishing and price of the book.



### SEMESTER-III

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1	BCA271	Mathematics-III	4	1	-	5
2	BCA201	Data Structure Using C	3	1	-	4
3	BCA203	Operating System	3	1	-	4
4	BCA205	Fundamentals Of Database Systems	3	1	-	4
5	BCA207	Web Technology - I	3	0	2	4
6	BCA221	Data Structure Lab Using C	-	-	2	1
7	BCA223	Database management Systems Lab	-	-	2	1
<b>Total</b>			<b>16</b>	<b>4</b>	<b>6</b>	<b>23</b>

# BCA - Semester III

## MATHEMATICS-III (PROBABILITY AND STATISTICS)

Course code: BCA271

L-4, T-1, P-0, C-5

### Course Contents

#### UNIT-I

**Probability:** Introduction, Events & Different Types of Events, Addition & Multiplication Law, Conditional Probability, Baye's Theorem.

**Probability Distribution:** Random Variables, Probability Function, Binomial Poison & Normal Distribution.

#### UNIT-II

**Statistics:** Definition, Function & Scope of Statistics.

**Measures of Central Tendency:** Arithmetic Mean, Weighted A.M., Median, Mode, Geometric & Harmonic Mean and Their Merits & Demerits.

**Measures of Variation:** Range, The Interquartile Range or Quartile Deviation, Average (Mean), Deviation Standard Deviation, Coefficient of Variation, Skew ness, Moments & Kurtosis.

**Correlation Analysis:** Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient.

**Regression Analysis:** Difference Between Correlation & Regression, Regression Lines, Regression Equations, Regressions Coefficient.

#### UNIT-III

**Sampling Distribution:** Chi Square ( $X^2$ ) Distribution and Its Properties, Chi - Square Test, Application of Chi -Square Distribution: Chi-Square Test for Population Variance, ChiSquare Test of Goodness of Fit, Independence of Attributes, T- Distribution & Its Properties, Application of T - Distribution to Testing Hypothesis About Population Mean, Difference Between Two Means, Correlation Coefficient, F- Distribution.

#### Text Books:

1. S.P. Gupta & M.P. Gupta, "Business Statistics", Sultan Chand & Sons.
2. S.C. Gupta & V.K. Kapoor, "Fundamental of Mathematical Statistics", Sultan Chand & Sons.
3. Goon, Gupta and Dasgupta – Fundamentals of Statistics - The world press private ltd. , Kolkata
4. Hogg R.V. and Craig R.G. – Introduction to Mathematical Statistics Ed 4 (1989) - Macmillan Pub. Co. New York .
5. D.N. Elhance – Fundamentals of Statistics – Kitab Mahal, Allahabad.
6. Snedecor G.W. and Cochran W.G. (1989): Statistical methods, 8 ed., Affiliated East West.

\* Latest editions of all the suggested books are recommended.

# BCA - Semester III

## DATA STRUCTURE USING 'C'

Course Code: BCA201

L-3, T-1 P-0, C-4

**Objective:** To give an overview about how the data organizes and the techniques to organize the data. Develop good understanding of how operations are performed on data in various data structures including hierarchical representation. To develop a base for advanced computer science study.

### Course Contents

#### Unit-I

**Introduction:** Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm, Complexity and Time-Space trade-off.

**Arrays:** Array Definition, Representation and analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation.

#### Unit-II

**Stacks:** Array Representation and Implementation of stack, Operations on Stack: Push & Pop, Linked Representation of Stack, Operations Associated with Stack, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using Stack.

**Queues:** Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Circular queue.

#### Unit-III

**Linked list:** Representation and Implementation of Singly Linked List, Traversing and Searching of linked List, Overflow and Underflow, Insertion and deletion to/from Linked List, Insertion and deletion algorithms, Doubly linked list, Circular List, Linked List v/s Array.

#### Unit-IV

**Sorting:** Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, and Heap Sort. Comparative Analysis of above Sorting algorithms. **Searching:** Sequential search, Binary search.

## Unit-V

**Trees:** Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary tree, Binary Search Tree. **Graph:** Basic terminology, Graph representation using adjacency matrix, Graph representation using adjacency list.

### Text Books:

1. Lipschutz, *Data Structure*, Tata McGraw Hill
2. Tenenbaum et. al A.M., *Data Structures Using C & C++*, Prentice Hall of India.
3. KanitkarYashwant, *Data Structure Using C*, BPB
4. Salaria R.S., *Data Structure Using C*, Khanna Publishers

### Reference Books:

1. Horowitz and Sahani, *Fundamentals of Data Structures*, Galgotia
2. Kruse et.al R., *Data Structures and Program Design in C*, Pearson Education
3. Cormen T. H., *Introduction to Algorithms*, Prentice Hall of India.
4. Loudon K., *Mastering Algorithms with C*, Shroff Publisher & Distributors
5. Bruno R Preiss, *Data Structures and Algorithms with Object Oriented Design Pattern in C++*, John Wiley & Sons Inc.
6. Adam Drozdek, *Data Structures and Algorithms in C++*, Thomson Asia

\* Latest editions of all the suggested books are recommended.

# **BCA - Semester III**

## **OPERATING SYSTEM**

**Course Code: BCA203**

**L-3, T-1, P-0, C-4**

**Objective:** This course has theory component to teach you the concepts and principles that underlie modern operating systems. In this component, you will learn about processes and processor management, concurrency and synchronization, memory management schemes, file system and secondary storage management, security and protection, etc.

### **Course Contents**

#### **Unit - I**

Introduction to the Operating System (OS), Types of Operating System: Batch System, Time Sharing System, Real Time System. Multi Programming, Distributed System, Functions and Services of OS.

#### **Unit - II**

Process Management: Process Concept, Process State, Process Control Block, Process Scheduling, CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Preemptive & Non Preemptive Scheduling.

#### **Unit - III**

Deadlocks-System model, Characterization, Deadlock Prevention, Deadlock Avoidance and Detection, Recovery from deadlock.

#### **Unit - IV**

Memory Management: Logical Address, Physical Address, External and Internal Fragmentation. Concept of paging, Page table structure - Hierarchical Paging, Hashed Page Tables, Inverted Page Table.

#### **Unit -V**

Information Management: File Concept, Access Methods, Directory Structure. Device Management: Disk Structure, Disk Scheduling Algorithms.

**Text Books:**

- 1.Silbershatz and Galvin," Operating System Concept", Addison Wesley, 2002.
- 2.Nutt, G., "Operating Systems", Addison-Wesley.
- 3.GodboleAhyut, "Operating System", PHI, 2003.

**Reference Books:**

- 1.Flynn, Mchoes, "Understanding Operating System", Thomson Press, Third Edition, 2003
  - 2.Tannenbaum,"Operating System Concept", Addison Weseley, 2002.
  - 3.Joshi, R. C. and Tapaswi, S., "Operating Systems", WileyDreamtech.
- \*Latest editions of all the suggested books are recommended.

# BCA - Semester III

## FUNDAMENTALS OF DATABASE SYSTEMS

Course Code: BCA205

L-3, T-1, P-0, C-4

### Objective:

This syllabus design is an attempt to provide the basic information about database management system and their development. It will also provide the basic conceptual background necessary to design and develop simple database application. The major objectives of this subject are to:

- Provide an introduction of DBMS and their use;
- Describe the main features and function of the DBMS;
- Describe the features of relational database and E-R models;
- Implement SQL queries;
- Draw ER diagrams;
- Design database.

### Course Contents

#### Unit - I

**Introduction:** Elements of Database System, Characteristics of database approach, File system versus Database System, Data models and Types, DBMS architecture and data independence. Features and Functions of Database System.

#### Unit - II

**E-R Modeling:** Entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, relational schema ,enhanced E-R and overview of object modeling. Specialization and generalization. Basic concepts of relational algebra: Selection, Projection, Join, Union, Intersection, Divide, Minus.

#### Unit - III

**Relational Data Model:** Relational model concepts, relational constraints, relational algebra. SQL: SQL queries, programming using SQL, Integrity Constraints, Roles and privileges, data definition, aggregate function, Null Values, nested sub queries, Joined relations.

#### Unit - IV

Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design

**Data Normalization:** Functional dependencies, Normal form up to 3rd normal form & BCNF.

## Unit - V

**Concurrency Control:** Transaction processing, locking techniques, database recovery, security and authorization. Overview of recovery techniques and Database Security.

### Text books:

1. Silberschatz Abraham, Korth Henry & Sudarshan S., *Database Systems Concepts*, McGraw Hill, 1997.
2. Elmasri R. & Navathe S.B., *Fundamentals of Database Systems*, Addison Wesley, 2004
3. Date C.J., *An Introduction to Database Systems*, Addison Wiley.
4. Alexis Leon & Mathews Leon, "Fundamentals of Database Management Systems", Leon Vikas Publication

### Reference Books:

1. Melton Jim & Simon Alan, *Understanding the New SQL: A Complete Guide*, Morgan Kaufmann Publishers, 1993.
2. Majumdar A. K. & Battacharya P., *Data Base Management Systems*, Tata McGraw Hill, 1996.
3. Bipin Desai, *An Introduction to Database Systems*, Galgotia Publications, 1991.



# BCA - Semester III

## Web Technology - I

Course Code: BCA207

L-3, T-0, P-2, C-4

### Objective:

1. To develop the skill & knowledge of Web page design.
2. Students will understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and Web site development studio and other information technology sectors.

### Unit-I

HTML Over view, HTML Document Structure, HTML Tags :-Heading Tags, Paragraph Tag, Line Break Tag, Centering Content, Horizontal Lines, Nonbreaking Spaces, HTML Elements:- HTML Tag vs. Element, Nested HTML Elements, HTML Attributes:- Core Attributes, Internationalization Attributes, HTML Formatting:- Bold Text, Italic Text, Underlined Text, Strike Text, Monospaced Font, Superscript Text, Subscript Text, Inserted Text, Deleted Text, Larger Text, Smaller Text, Grouping Content, HTML Fonts, HTML Color, HTML Images:- Insert Image, Set Image Location, et Image Width/Height, Set Image Border, Set Image Alignment. (Lecture 08)

### Unit-II

HTML Tables:- Table Heading, Cellpadding and Cellspacing Attributes, Colspan and Rowspan Attributes, Tables Backgrounds, Table Height and Width, Table Caption, Table Header, Body, and Footer, Nested Tables, HTML List:- Unordered Lists, type Attribute, Ordered Lists, type Attribute, HTML Text Link:- Linking Documents, target Attribute, Use of Base Path, Linking to a Page Section, Setting Link Colors, Download Links, HTML Image Link:- Mouse-Sensitive Images, Server-Side Image Maps, Client-Side Image Maps, Coordinate System, HTML Email Link:- HTML Email Tag, HTML Frames:- Creating Frames, The <frameset> Tag Attributes, The <frame> Tag Attributes, Disadvantages of Frames, HTML IFrames:- The <iframe> Tag Attributes, HTML Header tag, The <marquee> Tag Attributes, HTML Embed Multimedia:- The <embed> Tag Attributes, Supported Video Types, Background Audio, HTML Object tag. (Lecture 08)

### Unit-III

HTML Backgrounds:- Html Background with Colors, Html Background with Images, Patterned & Transparent Backgrounds , HTML Layout:- HTML Layout - Using Tables, Multiple Columns Layout - Using Tables, HTML Layouts - Using DIV, SPAN, HTML Forms:- Form Attributes, HTML Form Controls, Text Input Controls, Single-line text input controls, Attributes, Password Input controls, Multiple-Line Text Input Controls, Checkbox Control, Radio Button Control, Select Box Control, File Upload Box, Button Controls, Hidden Form Controls. (Lecture 08)

## Unit-IV

**Java Script:- Overview,** Client-Side JavaScript, Advantages of JavaScript, Limitations of JavaScript, Syntax:- First JavaScript Code, Whitespace and Line Breaks, Case Sensitivity, Comments in JavaScript, Enabling:- Using Web browser (Internet Explorer, Chrome, Mozilla etc.), Placement:- Internal File, External File, Java Script Variables:- Data types, Variables, Scope, Reserve Words, Operators:- Arithmetic Operators, Logical Operators, Comparison Operators, Bitwise Operators, Miscellaneous operators, If-else, Switch, While loop, for loop, for-in loop, loop control – break, continue, Function:- Function Definition, Calling a Function, Function Parameters, The return Statement, Nested Functions, Function () Constructor, Function Literals, Events:- What is an Event?, onclick Event Type, onsubmit Event Type, onmouseover and onmouseout, Standard Events, **Dialog Box:-** Alert Dialog Box, Confirmation Dialog Box, Prompt Dialog Box, JAVA Script Objects:- Object Properties, Object Methods, User-Defined Objects, Defining Methods for an Object, The ‘with’ Keyword, DOM (Document Object Model), Array:- Array Properties, constructor, length, Prototype, Array Methods (concat (),forEach () etc.) String:- String Properties, constructor, Length, Prototype, String Methods(charAt(),indexOf () etc.), Errors and Exceptions :- Syntax Errors, Runtime Errors, Logical Errors, The try...catch...finally Statement, The throw Statement, The onerror( ) Method, Form Validation:- Basic Form Validation, Data Format Validation. (Lecture 08)

## Unit-V

CSS introduction, CSS Syntax, Concept of CSS: Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts),Working with block elements and objects, Working with Lists and Tables,CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties),CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector)CSS Color, Creating page Layout and Site Designs CSS style sheet: External Style Sheets, Internal Style Sheets, Inline Style, The class selector: div & span tag.  
DOM HTML DOM, inner HTML, Dynamic HTML (DHTML), DHTML form, XML DOM

### Text Books:

1. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar & others, Cengage Learning

### Reference Books:

2. Web Programming: Building Internet Applications, Chris Bates, Wiley Dreamtech.
3. Programming the World Wide Web, Robert W Sebesta, Pearson
4. Web Technologies, Uttam K Roy, Oxford
5. Web Technology: A developer perspective, Gopalan & Akilandeswari, PHI

# **BCA - Semester III**

## **DATA STRUCTURE USING 'C' LAB**

**Course Code: BCA221**

**L-0, T-0, P-2, C-1**

### **Course Contents**

Program based on:

**Array:** Insertion of element in an array , deletion of element from an array.

Sorting : Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Two Way Merge Sort and Heap Sort.

Searching : Sequential search, binary search.

**Stack:** Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Conversion of Infix to Prefix and Postfix Expressions.

**Queue:** Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Circular queue

**Linked list:** Representation and Implementation of Singly Linked List, Traversing and Searching, Inserting and Deleting of Linked List. Same operation in Doubly Linked List, Circular Linked List.

**Binary Search Tree:** Creation, searching and traversal.

# **BCA - Semester III**

## **DATABASE MANAGEMENT SYSTEM- LAB**

**Course Code: BCA223**

**L-0, T-0, P-2, C-1**

### **Course Contents**

The Programme to be implemented using SQL:

1. Create Table, insert data into tables, Deletion, Updation
2. Retrieval of data using SQL statement with all possible clauses.
3. Using aggregate function
4. Using group by and having clause
5. Write query for Join, set operation, and nested queries.
6. Creating View

## SEMESTER-IV

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1	BCA270	Mathematics-IV	4	1	-	5
2	BCA280	Fundamentals Of Accounting	3	0	-	3
3	BCA200	OOPs & C++	3	1	-	4
4	BCA202	Computer Graphics	3	1	-	4
5	BCA204	Software Engineering	3	1	-	4
6	BCA220	OOPs & C++ LAB	-	-	2	1
7	BCA222	Computer Graphics Lab	-	-	2	1
<b>Total</b>			<b>16</b>	<b>4</b>	<b>4</b>	<b>22</b>

# BCA - Semester IV

## MATHEMATICS-IV (NUMERICAL METHODS)

**Course Code: BCA270**

**L-4, T-1, P-0, C-5**

**Objective:** Numerical Analysis is the study of algorithms for solving problems of continuous mathematics. This paper provides an introduction to finite differences, interpolation, numerical differentiation and integration, differential and linear equation.

### **Course Contents**

#### **Unit - I**

**Finite Differences:** Types of operators and relations among operators, forward and backward difference table, Computation of Missing terms, Factorial Notations and reciprocal factorial. Polynomial in factorial notions

#### **Unit - II**

**Solution of System of Linear Equation:** Gauss Elimination method, Gauss Jordan method, Gauss Seidel method, Gauss Jacobi method.

#### **Unit - III**

**Interpolation:** Newton's forward and backward interpolation formula. Interpolation with unequal Intervals- Lagrange's interpolation formula, Inverse Interpolation, Lagrange's method for inverse Interpolation.

**Divided Difference:** Divided difference table and properties, Newton Divided difference formula.

#### **Unit - IV**

**Numerical Differentiation:** Numerical Differentiation by Newton's forward and backward interpolation formula.

**Numerical Integration:** Trapezoidal rule, Simpson 1/3 Rule, Simpson's 3/8.

#### **Unit - V**

**Solution of Differential Equation:** Picard's Method, Euler's Method, Runge- Kutta Method and Predictor- Corrector Method.

**Text Books:**

1. Grewal B. S., “Numerical methods in Engineering and Science”, Khanna Publishers, Delhi
2. Pradip Niyogi, “Numerical Analysis and Algorithms”, TMH

**References:**

2. Grewal Rajaraman V., “Computer Oriented Numerical Methods”, PHI
3. T. Veerarajan, T Ramachandran, “Theory and Problems in Numerical Methods”, TMH
4. Francis Scheld, “Numerical Analysis”, TMH
5. Manoj Kumar, “Computer based Numerical & Statistical Techniques”, Krishna Prakashan.

\*Latest editions of all the suggested books are recommended.

# **BCA - Semester IV**

## **FUNDAMENTALS OF ACCOUNTING**

**Course Code: BCA280**

**L-3, T-0, P-0, C-3**

**Objective:** The basic objective of this course is to provide fundamental knowledge of Accounting.

### **Course Contents**

#### **Unit - I**

**Accounting:** Meaning and Concepts, Difference between accounting and book keeping, Importance and Limitations of Accounting, Users of Accounting information, Accounting Principles, Conventions and Concepts, Double entry system of book keeping, Accounting equations, Types of accounts, Rules of debit and credit.

#### **Unit - II**

**Accounting Process:** Journal, Ledger, Subdivision of Journal, Triple column cash book, Debit note, Credit note, Trial balance.

#### **Unit - III**

**Preparation of Final Accounts:** Manufacturing Account, Trading Account, Profit and Loss Account, Balance Sheet (without adjustments).

#### **Unit - IV**

Bank Reconciliation Statements, Fixed assets accounting, Depreciation- Straight line and Reducing balance method. Capital and Revenue items.

#### **Text Books:**

1. Maheswari S.N. & Maheswari S. K., Introduction to Financial Accountancy, Vikas Publications
2. Grewal. T.S. ,Fundamentals of Accounting, Sultan chand & Sons Pvt Ltd New Delhi
3. Goel D.K. , Introduction to Accounting

#### **Reference Books:**

1. Jawahar Lal, Financial Accounting, Wheeler Publishing.
2. Gupta R.L. & Radhaswamy-Fundamentals of Accounting
3. Chawla & Jain-Financial Accounting



# BCA - Semester IV

## SOFTWARE ENGINEERING

**Course Code: BCA204**

**L-3, T-1, P-0, C-4**

**Objective:** The study of this course will help students understand how to manage the development of industrial strength software. They will learn about various phases of software development and use of various development models for the same. They will learn concepts of software design, software testing and maintenance. They will learn about the role of software reliability and quality assurance

### **Course Contents**

#### **Unit -I**

Introduction: Software Engineering approach, Need of engineering aspect for Software Design, SDLC, Software Crisis, Software Process, Process models (Classical Waterfall Model, Build-n-Fix Model, Iterative Waterfall Model, Prototyping Model, Evolutionary Model and Spiral Model)

#### **Unit -II**

Software Requirement Analysis and Specifications: Software Requirement Specifications, Need of SRS, Steps for constructing good SRS, Behavioral and Non-Behavioral requirements, Analysis Model

#### **Unit -III**

Software Design: Design Concepts & Principle, problem partitioning, abstraction, and top down and bottom up-design, Cohesion & Coupling, How to measure degree of Cohesion and Coupling, Function Oriented Design, DFDs, Structure Chart, Object Oriented Design.

Coding: Top-Down and Bottom-Up programming, Structured programming, Programming style, Do's and Don'ts for Coding

#### **Unit -IV**

Software Testing: Validation and Verification, Black Box testing approach, White Box testing approach, Levels of testing: Unit Testing, Integration Testing, Validation testing, System testing and debugging.

#### **Unit -V**

Software Maintenance: Software Maintenance Process and its types, Introduction to Reverse Engineering.

Software Reliability & Quality Assurance: Software Reliability issues, Software quality, Overview of Quality Standards like ISO 9001, SEI-CMM and its comparison with ISO,

Introduction, scope and architecture of CASE.

**Text Books:**

1. Rajib Mall, “Software Engineering “, PHI
2. K.K.Agrawal & Yogesh Singh, “Software Engineering”, New Age Publication
3. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 3rd ed., McGraw Hill Int.Ed., 1992.

**Reference Books:**

1. Ian Sommerville. Software Engineering, Pearson Education (Addison Wesley),
2. P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
3. Waman S. Jawadkar, ”Software Engineering: Principles and Practice”, McGraw Hill

\*Latest editions of all the suggested books are recommended.

# BCA - Semester IV

## OOPs & C++

Course Code: BCA200

L-3, T-1, P-0, C-4

**Objectives:** To get a clear understanding of object-oriented concepts. To understand object oriented programming through C++ and to develop real life applications using Object Oriented Programming (OOP) concepts.

### Course Contents

#### Unit - I

**Introduction:** Introducing Object-Oriented Approach, Relating to other paradigms (functional, data decomposition). Basic terms and ideas: Abstraction, Encapsulation, Inheritance, Polymorphism, Basic programming of C++.

#### Unit - II

**Classes and Objects:** Encapsulation, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behavior of an object, Constructors and destructors, object types, Meta class, abstract classes.

#### Unit - III

**Inheritance:** Access specifiers, Types of inheritance, Ambiguity resolution in Multiple Inheritance, Constructor calling (Implicit and Explicit Constructor call) to base class, Containership and inheritance, Virtual Base Class.

#### Unit - IV

**Friend:** Friend Function, Friend Member Function and Friend Class.

**Polymorphism:** Function Overloading, Operator overloading, operator overloading using Friend. Virtual function & Pure Virtual function

#### Unit - V

**File Handling:** Stream Classes Hierarchy, Opening and closing FILE, Read and write in file. File pointers and Manipulations, Error Handling in File Operation, Command line Argument.

#### Text Books:

1. Lafore R., *Object Oriented Programming using C++*, Galgotia
2. Venugopal A.R. & Rajkumar, T. Ravishanker, *Mastering C++*, Tata Mc Graw Hill, 1997.
3. Lippman S. B. & Lajoie J., *C++ Primer*, Addison Wesley, 3<sup>rd</sup> Edition, 2000.

## **Reference Books:**

1. Parasons D., *Object Oriented Programming with C++*, BPB Publication.
2. Steven C. Lawlor, *The Art of Programming Computer Science with C++*, Vikas Publication.
3. Schildt Herbert, *C++: The Complete Reference*, Tata McGraw Hill, 1999.
4. Tony Gaddis, Watters, Muganda, *Object-Oriented Programming in C++*, Dreamtech, 2004.

\*Latest editions of all the suggested books are recommended.

# BCA - Semester IV

## COMPUTER GRAPHICS

Course Code: BCA202

L-3, T-1, P-0, C-4

**Objective:** This subject covers computer graphics concepts and basic techniques for operating with two-dimensional objects. It gives an overview of typical applications of computer graphics. On completion of this subject, the student will be able to understand and apply the basic principles, techniques, and algorithms for generating and interacting with simple graphical objects on display screen

### Course Contents

#### Unit - I

**Introduction Of Computer Graphics:** Application areas of Computer Graphics, Overview of graphics systems. **Graphics primitives:** video-display devices, and raster-scan systems, random scan systems, Plasma displays, LCD, input devices, input techniques.

#### Unit - II

**Output Primitives:** Points and lines, Line drawing algorithms: DDA, Bresenham's algorithm, Mid-point algorithm, Circle drawing algorithms: Mid-point algorithm, Bresenham's algorithm, Ellipse drawing Bresenham's algorithm, Filled area primitives: Scan line polygon fill algorithm, Boundary-fill and Flood-fill algorithms.

#### Unit - III

**2-D Geometrical Transforms:** Translation, rotation, scaling, reflection and shear transformations, homogeneous coordinate system, composite transforms, transformations between coordinate systems, Introduction of 3-D Transformation

#### Unit - IV

**2-D Viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm, Curve clipping, Text clipping.

#### Unit - V

**Computer Animation:** Design of animation sequence, General computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

**Text Books:**

1. Donald Hearn & M.Pauline Baker, *Computer Graphics C Version*, Pearson Education
2. VanDam, Feiner & Hughes, *Computer Graphics Principles &Practice*, Pearson Education.
3. Steven Harrington, *Computer Graphics*, Tata McGraw Hill.
- 4.Schaum's Outline Computer Graphics,McGraw-Hill

**Reference Books:**

1. Donald Hearn & M.Pauline Baker, *Computer Graphics*, Prentice Hall of India.
2. Zhigand Xiang, Roy Plastock, Schaum's Outlines, *Computer Graphics*, Second Edition, Tata Mc-Graw Hill.
3. David F Rogers, *Procedural Elements for Computer Graphics*, Tata McGraw Hill,
4. Govil Shalin, *Principles of Computer Graphics*, PAI, Springer.
5. Steven Harrington, *Computer Graphics*, Tata McGraw Hill.
6. Amrendra N Sinha and Arun D Udai," Computer Graphics", TMH

# BCA - Semester IV

## OOPs & C++ LAB

Course code: BCA220

L-0, T-0, P-2, C-1

### Course Contents

Write programs in C++ for

1. Program illustrating basic input/output operations using CIN, COUT.
2. Implementing class and objects.
3. Implementing function overloading.
4. Implementing various constructors and destructor
5. Program illustrating overloading of various operators.
6. Program illustrating use of Friend, Inline, Static Member functions, default arguments.
7. Program illustrating various forms of Inheritance
8. Program illustrating use of virtual functions, virtual Base Class.
9. Program illustrating use of file handling

# **BCA - Semester IV**

## **COMPUTER GRAPHICS LAB**

**Course Code: BCA222**

**L-0, T-0, P-2, C-1**

### **Course Contents:**

1. Programs for designing objects in graphics by using Library functions.
2. Programs to draw the line, circle by using algorithms.
3. Programs to fill polygons by using algorithms.
4. Programs to implement line clipping.
5. Programs to implement 2-D transformation on objects.
6. Programs to do basic animation by using graphics.



## SEMESTER-V

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1.	BCAxyz	Elective-I	3	1	-	4
2.	BCAxyz	Elective-II	3	1	-	4
3.	BCA301	Computer Networks	3	1	-	4
4.	BCA303	VB.Net	3	1	-	4
5	BCA305	Web Technology - II	3	1	-	4
6.	BCA321	VB.Net Lab	-	-	2	1
7.	BCA323	Web Technology – II Lab	-	-	2	1
<b>Total</b>			<b>15</b>	<b>5</b>	<b>4</b>	<b>22</b>

# **BCA - Semester V**

## **ELECTIVE-I (SOFTWARE PROJECT MANAGEMENT)**

**Course Code: BCA331**

**L- 3, T-1, P-0, C-4**

**Objective:** The study of this course will help students understand how to manage the complexity in developing industrial strength software. They will learn about various aspects of software project planning. They will learn concepts of Project Organization and Scheduling, Project Monitoring and Control, Software Configuration Management and the like that holds value for developing a quality software.

### **Course Contents**

#### **Unit -I**

Introduction and Software Project Planning, 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.

#### **Unit -II**

Project Organization and Scheduling 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.

#### **Unit -III**

Project Monitoring and Control, 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.

#### **Unit -IV**

Software Quality Assurance and Testing, Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities.

**Unit -V**

Project Management and Project Management Tools, 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. M. Cotterell, 'Software Project Management', McGrawHill
2. S A Kelkar, 'Software Project Management: A Concise Study', PHI

**Reference Books:**

1. Kathy Schwalbe, 'Information Technology Project Management', CENGAGE

\*Latest editions of all the suggested books are recommended.

# **BCA - Semester V**

## **ELECTIVE-II (MANAGEMENT INFORMATION SYSTEM)**

**Course Code: BCA330**

**L-3, T-1, P-0, C-4**

**Objective:** The Management Information system is an idea which is associated with man, machine, marketing and methods for collecting information's from the internal and external source and processing this information for the purpose of facilitating the process of decision-making of the business. In this process, computer has added on more dimensions such as speed, accuracy and increased volume of data that permit the consideration of more alternatives in decision making process.

### **Course Contents**

#### **Unit -I**

**An Overview of Management Information Systems:** Types of information systems, Definition of a management information system, Concept of an MIS, MIS & Decision Support Systems.

#### **Unit –II**

**Information System:** End user and Enterprise Computing, Computer Peripherals, Application software and System software, Technical foundation of database management, managing data Resources.

#### **Unit -III**

**Foundation of Information Systems in Business:** Information system in business. The Components of Information system, Fundamentals of strategic advantage, Using Information for strategic advantage.

#### **Unit -IV**

**Business Applications of Information Technology:** Internet & Business, Intranet, Extranet & Enterprise Solutions, Information System for Managerial Decision Support.

#### **Unit -V**

**Managing Information Technology:** Managing Information Resources and technologies, Global information technology, Security and control Issues in Information system, ethical and societal challenges of IT.

**Text Books:**

1. Brian O., *Management Information System*, Tata McGraw Hill
2. Gordon B., Davis & Margrethe H. Olson, *Management Information System*, Tata McGraw Hill
3. Brian O., *Introduction to Information System*, McGraw Hill.

**References Books:**

1. Murdick, *Information System for Modern Management*, PHI.
2. Jawadekar, *Management Information System*, Tata McGraw Hill.
3. Jain Sarika, *Information System*, PPM
4. Davis, *Information System*, Palgrave Macmillan

\*Latest editions of all the suggested books are recommended.

# BCA - Semester V

## VB.NET

**Course Code: BCA303**

**L-3, T-1, P-0, C-4**

**Objective:** The objective of learning vb.net is to provide a platform to students so that they can utilize their skills in this competitive and technological era. This is the age of computer and computer made our work easy by the use of software like system software, application software and utility software. Obviously this programming language will help the student to groom and furnish their talent and they can serve the overall growth of organization or nation.

### **Course Contents**

#### **Unit- I**

**NET Framework:** Introduction, Common Language Runtime, Common Type System, Common , Language Specification, Base Class Library, .NET class library Intermediate language, Just in-Time compilation, Garbage Collection, Application installation & Assemblies.

**VB.NET IDE:** Start Page, Menu and Tool Bar, Toolbox, Solution Explorer, Properties Window, Task List and Output Window, Server Explorer.

#### **Unit -II**

Variables, Constants, Keywords, Data types, Operators, Decisions with if statement, Select Case statements, Loops, Arrays.

**Strings:** Substring Method, Trim Method, Equals, Replace and Insert Methods, Split and Join Method, InStr Method.

#### **Unit-III**

An Introduction to Functions and Subs, Create your own Subs , Create a Function ,Class and Objects, Create Properties in your Classes, Error Handling, Working with Textbox, Buttons, Labels, Checkbox, Radio Buttons, List box, Combo Box, Picture Box, Menu, Events: The Click Event, The Key Down Event, The Form Load Event

#### **Unit- IV**

**ADO.NET:** ADO.NET Data Namespaces, SqlConnection, SqlCommand, SqlDataAdapter, DataSet Class, Data View.

**ASP.NET:** Introduction to ASP.NET Web Forms, Implementation of ASP.NET controls: Dropdown List, Textbox, Button, Checkbox, Radio Button.

#### **Unit -V**

**Working with Text Files:** Introduction to Text File, Open Text File, Read Text File Line by Line, Write to Text File in VB .NET, Appending Text to File, Copy File, Move File, Delete File.

**Text Books:**

1. Blair Richard & Crosland Jonathan, *Beginning VB.NET (2 Edition)*, WROX
2. Steven Holzner, *Visual Basic NET 2003*, Pearson Education
3. Shouish Chavan, *Visual Basic NET*, Pearson Education

**Reference Books:**

1. Jeffrey Richter, *Applied Microsoft Net Framework Programming*, Microsoft
2. Blair Richard & Crosland Jonathan *Professional VB.NET*, Willy
3. Fergal Grimes, *Microsoft Net for Programmers*, SPD

\*Latest editions of all the suggested books are recommended.

# BCA - Semester V

## COMPUTER NETWORKS

Course Code: BCA301

L-3, T-1, P-0, C-4

**Objective:** The Objective of this subject is to provide the Fundamental Knowledge of Computer Networks and to provide the knowledge of some recent trends in Computer Networks.

### Course Contents

#### Unit - I

**Introductory Concepts:** Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer- transmission, switching methods, Integrated services digital networks.

#### Unit - II

**Medium access sub layer:** Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, Ethernet, Error correction & detection algorithms, elementary data link layer protocols, sliding window protocols, error handling, High Level Data Link Control .

#### Unit-III

**Network Layer:** Point-to Point networks, concept of virtual circuit and LAN, routing algorithms, congestion control algorithms, internetworking, TCP/IP protocol, UDP, SCTP, IP addresses, IPv6 Packet Format , Subnetting.

#### Unit-IV

**Transport Layer:** Design issues, connection management, Internet Transport Protocol (UDP), Ethernet transport Protocol, Transmission Control Protocol. (TCP).

#### Unit-V

**Application Layer:** Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Introduction to Cryptography and Network Security Communication Security (IPSec, Firewalls). Implement a program in for encryption a text with network security algorithm.



**Text Books:**

1. Computer Networks by A. S Tanenbaum, 4<sup>th</sup> Edition”, Pearson education
2. Data and Computer Communication by W. Stallings, Macmillan Press
3. Computer Networks & Internet with Internet Applications by Comer Pearson Education
4. Internetworking with TCP/IP by PHI
5. Data Communication and Networking by Forouzan TMH

**Reference Books:**

1. Computer Networks with Internet Protocols by W Stallings, Pearson Education
2. Local and Metropolitan Area Networks by W Stallings, VI<sup>th</sup> edition, Pearson Education

\*Latest editions of all the suggested books are recommended.

# BCA - Semester V

## WEB TECHNOLOGY -II

**Course Code: BCA305**

**L-3, T-1, P-0, C-4**

**Objective:** PHP is the latest trend in the IT sector and this course is designed to make the students aware of the web development standards and technologies, and to make them ready for developing the web applications with the help of PHP as a language. At the completion of this course the students will be able to attain good job in web development sector. Also by this course they will know, the current web development trend in the IT sector.

### **Course Contents**

#### **Unit - I**

Web Essentials: Clients, Servers, and Communication. The Internet Protocols, HTTP, HTTPS, Markup Languages: An Introduction to HTML, History-Versions, Overview of XML and its benefits.

#### **Unit - II**

Style Sheets: CSS-Introduction to Cascading Style Sheets, Features, Style Sheets and HTML Style Rule, Introduction to JavaScript, Syntax, Variables and Data Types, Statements, Operators, Literals, Functions, Objects, Arrays.

#### **Unit - III**

PHP-Introduction to PHP, History, WebServer, WAMP, Installation and Configuration files, Syntax, Operators, Variables, Constants, Control, Structure, Language construct and functions, Function – Syntax, Arguments, Variables, References, Returns and Variable Scope.

#### **Unit - IV**

Arrays and its types, Date and Time functions, OOP's – Instantiation, Modifiers, Inheritance, Interfaces, Exceptions, Static Methods and Properties, String functions. Web Features- Sessions, Forms, GET and POST data, Cookies.

#### **Unit - V**

Introduction to AJAX, AJAX and its applications, working of AJAX, Introduction to web services, advantages of web services, web services platform elements, Introduction to MySQL, Database connectivity in PHP and its types, insertion, deletion, updating and retrieval of data from database using PHP.

**Text Books:**

1. Ivan Bayross, HTML, DHTML, JavaScript, CSS, PHP, BPB Publications.
2. Ivan Bayross, PHP 5, BPB Publications
3. Andrew Curioso, Ronald Bradford, Patrick Galbraith, Expert PHP and Mysql, Wiley Publishing

**Reference Books:**

1. Professional PHP Programming, Jesus Castagnetto, Harish Rawat, Sascha Schumann, Chris Scollo, Deepak Veliath - Wrox Publications
2. Beginning PHP and MySQL 5, W. Jason Gilmore, Apress Publication
3. PHP 5 Advanced, Larry Ullman, Peachpit Press

\*Latest editions of all the suggested books are recommended.

# BCA - Semester V

## VB.NET LAB

Course Code: BCA321

L-0, T-0, P-2, C-1

### Course Contents

#### Level-01 (CONSOLE APPLICATION)

1. WCP to display a message “HELLO INDIA” on console.
2. WCP to perform arithmetic operation.
3. WCP to find whether a year is leap or not.
4. WCP to find the grades of a student according to their scores.
5. WCP to find factorial using for, while, do..while loops.
6. WCP to print table from 1-10.
7. WCP to perform various string operations.
8. WCP to identify choice of user using select..case.
9. WCP to declare & initialize various types of variables.
10. WCP to find the largest number among three numbers.
11. WCP to find maximum element in array a of size n.
12. WCP to find minimum element in array a of size n.
13. WCP to find LCM of two numbers.
14. WCP to find GCD of two numbers.
15. WCP to convert decimal to binary numbers.
16. WCP to swap two numbers.
17. WCP to sort an array.
18. WCP to add two matrices.
19. WCP to multiply two matrices.
20. WCP to implement function.
21. WCP to create a class to manage student marks record.
22. WCP to implement try..catch..finally.
23. WCP to print

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24. WCP to print  
1

12

123

1234

25. WCP to print  
1

21

321

432

1

26. WCP to print  
1

2 2

333

4444

27. WCP to print  
1

22

333

444

4

28. WCP to print

1

1 8

1 8 27

1 8 27 64

### **Level-02(WINDOW APPLICATION)**

1. WWP to find the area of a circle by using required window controls.
2. WWP to calculate sum of the digits of number entered by the user.
3. WWP to find reverse of a number entered by the user.
4. WWP to enter any number and check whether the no is palindrome or not.
5. WWP to enter any number and check whether the number is perfect or not.
6. WWP to enter any number and check whether the number is prime or not.
7. WWP to copy text of one textbox into another.
8. WWP to align text left, right & center in textbox.
9. WWP to implement rich textbox.
10. WWP to clear all textboxes by using for each loop.
11. WWP to implement message box(YES/NO type) on button click event.
12. WWP to show data in grid view from Ms-Access table.
13. WWP to implement login form.
14. WWP to copy list item from one to another.
15. WWP to find which checkbox is checked.
16. WWP to find which radio button is selected in a group.
17. WWP to load image in picture box.
18. WWP to find which combo box item is selected.
19. WWP to show data in combo box from Ms-Access table.
20. WWP to implement calculator.
21. WWP to validate textbox for empty value.
22. WWP to validate textbox for integer value.
23. Write a web based program to insert record in database of employees having fields namely empid, empname and empsalary.
24. Write a web based program to bind the values in dropdown list through coding.
25. Write a web based program to display the record of the employees in asp.net gridview.

# **BCA- Semester V**

## **WEB TECHNOLOGY –II Lab**

**Course Code: BCA323**

**L-0, T-0, P-2, C-1**

### **Course Contents**

1. Using various HTML Tags
2. Rendering tags in different browsers.
3. Combining JavaScript with HTML – Form Validation, User Input, Form Submission, etc
4. Creating CSS to combine with JavaScript.
5. Using AJAX
6. Using XMLHttpRequest objects within a Javascript code
7. AJAX based form validation
8. Loading a html page within a div tag using AJAX
9. Dynamic Data Loading using AJAX on a form
10. Creating Auto-suggest Text field using AJAX
11. Creating database driven web pages in PHP.
12. Creating PHP pages using sessions and cookies.
13. Creating classes in PHP.
14. Creating instantiation, inheritance, interface and modifiers
15. Form Submission through GET and POST method.
16. File reading and writing programs.

\*Latest editions of all the suggested books are recommended.

## SEMESTER-VI

S.No.	Course Code	Subject	Periods			Credit
			L	T	P	
1.	BCA304	Core Java Programming	3	1	-	4
2.	BCA390	Project-II	-	-	28	14
3.	BCA322	Core Java Programming Lab	-	-	2	1
<b>Total</b>			<b>12</b>	<b>4</b>	<b>20</b>	<b>19</b>



# BCA- Semester VI

## CORE JAVA PROGRAMMING

Course Code: BCA304

L-3, T-1, P-0, C-4

**Objective:** The main objective of this course is to provide a straight forward way for the students to get their minds around Java and object-oriented programming. It also helps the students to get hands on experience on Java and to develop the cross platform applications. This course covers all the necessary topics that any students require to create an application in Java.

### Course Contents

#### Unit -I

**An Introduction to Java:** Java Platform, Buzzwords, Short History on Java, Installing JDK, Setting the PATH.

**Fundamental Programming Structures:** A Simple Java program, Data Types, Variables, Operators, Control Flow, Arrays, Big Numbers.

**Objects and Classes:** Introduction to Object Oriented Programming, Defining Your Own class, Introducing Methods, Method Overloading, Constructors, Argument Passing Mechanism, Object Destruction and Finalize, Understanding static.

#### Unit-II

**Inheritance:** Base class, Super class and Sub class, Object class, super keyword, Method Overriding, Dynamic Method Dispatch, Abstract Classes, final keyword.

String Handling, Packages and Interfaces, Access Specifiers, Exception Handling, Input /Output.

#### Unit- III

**Graphics Programming:** Applet Fundamentals, Introducing AWT, Working with Frame, Working with Graphics, Working with Shapes, Using Colors, Displaying Image.

**Event Handling:** Basics of Event Handling, Delegation Event Model, Event Classes, Event Listener Interfaces, Handling Mouse Events.

**AWT Controls:** Button, Label, Checkbox, CheckboxGroup, Choice, List, Scrollbar, TextField, TextArea, Menu Bar and Menu.

**Introduction to Layout Management:** Flow Layout, Border Layout, Grid Layout, GridBag Layout.

#### **Unit -IV**

**Swings:** Swings Overview, Creating a Swing Applet and Application.

**Swing Components:** Icon, JLabel, JTextField, JTextArea, JPasswordField, JButton, JCheckBox, JRadioButton, JComboBox, JList, JProgressBar, JMenuBar, JMenu, JToolBar, JScrollPane, JPanel, JTable, JSlider, JInternalFrame, Dialog Boxes.

#### **Unit -V**

**Multithreading:** Threads, Interrupting Threads, Thread States, Thread Priorities, Synchronization, Using Threads and Swings.

**JDBC:** Introduction to JDBC, Types of JDBC Drivers, JDBC-ODBC Bridge, Connecting to a database, Inserting and Retrieving Data from the Database.

**Utilities:** Using JAR and JAVADOC utilities.

#### **Text Books:**

1. Patrick Naughton & Herbert Schildt, *The Complete Reference JAVA2*, Tata Mc Graw Hill
2. Cay S. Horstmann & Gary Cornell, *Core Java 2 Volume I – Fundamentals*, PHI

#### **Reference Books:**

1. Balagurusamy E., *Programming in JAVA*, Tata McGraw Hill
2. Steven Holzner, *Java2 Black Book*, Dreamtech
3. Mark Wutica, “Java Enterprise Edition”, QUE

\*Latest editions of all the suggested books are recommended.

# **BCA- Semester VI**

## **CORE JAVA PROGRAMMING LAB**

**Course Code: BCA322**

**L-0, T-0, P-2, C-1**

1. Developing simple console application in Java.
2. Programs based on loops, arrays, operators and big numbers.
3. Programs based on Classes and Objects.
4. Programs based on Method Overloading, Constructors.
5. Simple application based on static keyword.
6. Programs based on Inheritance.
7. Programs based on Method Overriding, Dynamic Method Dispatch, Abstract Classes.
8. Programs based on String Handling.
9. Simple application to demonstrate the working of Packages.
10. Developing a Simple Applet.
11. An applet to demonstrate the working of Mouse Events.
12. Programs based on the usage of all AWT controls.
13. A simple application to demonstrate the working of Frames.
14. A simple swing application.
15. Programs to demonstrate event handling on various swing components.
16. Programs based on applets and multithreading.
17. A simple application to retrieve and insert records in MS-Access database.
18. A simple application to retrieve and insert records in My-SQL database.
19. Use of JAR and JAVADOC utilities.

## **PROJECT EVALUATION**

PAPER NO: BCA 390(Project) will be evaluated in the following manner

Mid Term Evaluation Mark (40%)	End Term Evaluation Mark (40%)	Average	40%
Supervisor			60 %

The Mid Term and End Term Evaluation will be done by a Committee of which the concerned supervisor is a member. The department will constitute a committee which will consist of the supervisor, one member of the faculty of the department and one member either from adjunct department of the university or one from outside the university. The same committee will evaluate the Midterm and End term Evaluation. The Committee will be duly approved by the Competent Authority. The TA/DA and other remuneration to the external evaluator shall be as per CUO norms.

### **Evaluation of Weightage:**

The average of the two (Mid Semester+ End Semester) will comprises of 40 % weightage and the supervisor of the project will have 60 % weightage of marks. In case two faculty supervising the project, the average of the 60% of weightage marks will be taken into account.

## ELECTIVE-I

<b>SLNO.</b>	<b>SUBJECT CODE</b>	<b>SUBJECT NAME</b>
1	BCA331	Software Project Management
2	BCA333	Embedded System
3	BCA335	Linux Environment
4	BCA337	E-Commerce
5	BCA339	Data Warehousing and Data Mining
6	BCA341	Parallel Computing
7	BCA343	Big Data Analytics

# SOFTWARE PROJECT MANAGEMENT

**Course Code: BCA331**

**L- 3, T-1, P-0, C-4**

**Objective:** The study of this course will help students understand how to manage the complexity in developing industrial strength software. They will learn about various aspects of software project planning. They will learn concepts of Project Organization and Scheduling, Project Monitoring and Control, Software Configuration Management and the like that holds value for developing a quality software.

## **Course Contents**

### **Unit -I**

Introduction and Software Project Planning, 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.

### **Unit -II**

Project Organization and Scheduling 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.

### **Unit -III**

Project Monitoring and Control, 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.

### **Unit -IV**

Software Quality Assurance and Testing, Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities.

## **Unit -V**

Project Management and Project Management Tools, 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.(**Lecture 08**)

### **Text Books:**

3. M. Cotterell, 'Software Project Management', McGrawHill
4. S A Kelkar, 'Software Project Management: A Concise Study', PHI

### **Reference Books:**

2. Kathy Schwalbe, 'Information Technology Project Management', CENGAGE

\*Latest editions of all the suggested books are recommended.

# EMBEDDED SYSTEMS

**Course Code: BCA333**

**L- 3, T-1, P-0, C-4**

## **Unit – I**

Introduction: Features of Embedded systems, Design matrices, Embedded system design flow, SOC and VLSI circuit.

ARM: An advanced Micro Controller, Brief history, ARM pipeline, Instruction Set Architecture ISA: Registers, Data Processing Instructions, Data Transfer Instructions, Multiplications instructions, Software interrupt, Conditional execution, branch instruction, Swap instruction, THUMB instructions. FPGA

## **Unit – II**

Devices and device drivers, I/O devices, Serial peripheral interfaces, IIC, RS232C, RS422, RS485, Universal serial bus, USB Interface, USB Connector IrDA, CAN, Bluetooth, ISA, PCI, PCI – X and advance busses, Device drivers.

Real time operating system: Hard real time, firm real time, soft real time, Task periodicity: periodic task, sporadic task, aperiodic task, task scheduling, scheduling algorithms: clock driven scheduling, event driven scheduling.

## **Unit – III**

Software and programming concept: Processor selection for an embedded system, State chart, SDL, PetriNets, Unified Modeling Language (UML).

Low power embedded system design: Dynamic power dissipation, Static power dissipation, Power reduction techniques, system level power management.

## **Unit – IV**

Hardware and software partitioning: K-L partitioning, Partitioning using genetic algorithm, particle swarm optimization, Functional partitioning and optimization: functional partitioning, high level optimizations. Hardware software co-simulations

## **Text Books:**

1. “Embedded System Design ” by Santanu Chattopadhyay, PHI
2. “Embedded system architecture, programming and design” By Raj Kamal, TMH

## **Reference Books:**

1. “Hardware software co-design of Embedded systems” By Ralf Niemann, Kulwer Academic.
2. “Embedded real time system programming” By Sriram V Iyer, Pankaj Gupta, TMH.



# LINUX ENVIRONMENT

Course Code: BCA335

L- 3, T-1, P-0, C-4

## UNIT I

**Introduction** – Short History - Why is Linux So Successful?- UNIX Flavors - BSD, SysV, Linux - Standards - System Architecture - The Kernel - The Shell - Utilities - Tools and Applications.

**Linux Programming Security** – Users and Groups - PUID & PGID - Real and Effective IDs - Authenticating Users - File System Permissions.

## UNIT II

**Programming under Linux**- Privileged Execution Mode - Kernel Mode Vs. User Mode System calls. **Files** - Using Files - Using Links - Working With Directories - Obtaining File Information – File Permissions - Special Permissions – **Signals** - The Way the Kernel Handles Signals- Types of Signals- Results of a Process - Receiving a Signal - Handling Signals – Signals List - Sending Signals - Handling Signals - Response to Signals - Activation of pause, signal - System Call for Signal Handling - Error Handler.

## UNIT III

**Process** - Programs and Processes - The Process IDs - The Process Table - The Process State PS Report - Process Status - Context Switch - The Process Environment - Process Group – Job and Processes - Process Termination - Creating a New Process - The wait Function Family - Executing a Program - The system C Library Function - Redirection of Input and Output - The vfork System Call.

## UNIT IV

**Threads** - Thread Creation - Thread Cancellation - Thread-Specific Data Synchronization and Critical Sections - GNU/Linux Thread Implementation - Processes Vs. Threads - **Inter-Process communication (IPC)** - Pipes - Named Pipes - Shared Memory - Message Queue – csh Level commands - **Synchronization Mechanisms** - File locking - Semaphore.

## UNIT V

**Sockets** - What Is A Socket? - A Brief History Of Sockets - Communication Protocols - communication Capabilities - Endpoint Addresses - The Internet Protocol (IP) – Internet Addresses - Address Classes - Connection Oriented Communications And TCP - Connectionless communications And UDP - Stream Sockets - The Basic Model - Sending Data(send) - Receiving Data(recv.) - Shutting Down A Socket - Related files - The select( ) System Call - Broadcast and Datagram Sockets

### TEXT BOOKS:-

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education, 2003.

## **REFERENCE BOOKS:-**

1. Unix Network Programming, W.R.Stevens, PHI.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

## **E-COMMERCE**

**Course Code: BCA337**

**L- 3, T-1, P-0, C-4**

### **UNIT-I**

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business(C2C)(2G, G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C)

### **UNIT-II**

Building Own Website: Reasons for building own website, Benefits of Website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Baner Exchange, Shopping Bots

### **UNIT-III**

Internet Security: Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime( Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus( How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorisation and Authentication, Firewall, Digital Signature( How it Works)

### **UNIT-IV**

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System, Types of Electronic Payment System, Payment Types, Traditional Payment, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash

### **UNIT-V**

Planning for Electronic Commerce: Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites, Internet Marketing, The PROS and CONS of online shopping, The cons of online shopping, Justify an Internet business, Internet marketing techniques, The E-cycle of Internet marketing, Personalisation e-commerce.

E – Governance for India: Governance of India, Indian customer EDI System, Service center, Imports, Exports.

### **Recommended Books :**

1. E-Commerce Concepts, Models, Strategies- :- G.S.V.Murthy Himalaya Publishing House
2. E- Commerce :- Kamlesh K Bajaj and Debjani Nag
3. Electronic commerce :- Gray P. Schneider
4. E-Commerce, Fundamentals & Applications : Chand (Wiley)

# DATA WAREHOUSING AND DATA MINING

Course Code: BCA339

L- 3, T-1, P-0, C-4

## Unit - I

**Introduction to Data mining:** Role Data in Data Mining, Data Mining functionalities, patterns in data mining, Type of patterns, Classification of Data Mining Systems, Major issues in Data Mining; **Mining Association Rules in Large Databases :** Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

## Unit -II

**Classification and Prediction:** Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Backpropagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, and Classifier Accuracy. **Cluster Analysis Introduction :** Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

## Unit -III

Introduction to WWW, Information Retrieval and Web Search: Basic Concepts, IR models, Relevance Feedback, Evaluation Measures, Text and Web Page Pre-Processing, Link Analysis: Graph Mining, Social Network Analysis, Co-Citation and Bibliographic Coupling, Page Rank, HITS, Community Discovery.

## Unit -IV

Web Crawling: Basic and Universal Crawlers, Structured Data Extraction: Wrapper Generation: Wrapper Induction, Automatic Wrapper Generation: Problems, String Matching and Tree Matching, Information Integration: Pre-Processing for Schema Matching, Domain and Instance-Level Matching.

## Unit -V

Opinion Mining: Sentiment Classification, Feature-Based Opinion Mining and Summarization, Opinion Search, Opinion Spam, Web Usage Mining: Data Collection and Pre-Processing, Data Modeling for Web Usage Mining, Discovery and Analysis of Web Usage Patterns, Privacy Preserving Data Mining: Issues and Solutions.

**Text Books:**

1. J. Han & M. Kamber, *Data Mining: Concepts and Techniques*, Morgan Kaufmann, 2<sup>nd</sup> ed, 2006. (Module 1)
2. Bing Liu. *Web Data Mining, Exploring Hyperlinks, Contents and Usage Data*, Springer Publishers (Module 2 and Module 3)

**References:**

1. Margret H Dunham, *Data Mining Introductory and advanced topics*, Pearson Education, 6<sup>th</sup> ed, 2009,
2. Shawkat Ali and Saleh Wasimi, *Data Mining: Methods and Techniques*, Cengage Learning, Indian Edition, 2009,

# PARALLEL COMPUTING

**Course Code: BCA341**

**L- 3, T-1, P-0, C-4**

## **Unit- I**

Introduction to parallel computing:

Parallel programming platforms: Trends in microprocessor Architectures, Limitations of memory system performance, Dichotomy of parallel computing platforms, physical organization of parallel platforms, communication costs in parallel machines, Routing mechanisms for interconnection network, Impact of process processors mapping and mapping techniques.

## **Unit – II**

Principles of parallel algorithm design: Preliminaries, Decomposition techniques, Characteristics of tasks and interactions, Mapping techniques for load balancing, Methods for containing. Interactions overheads, Parallel algorithm models.

## **Unit - III**

Basic communication operations: One-to-All Broadcast and All-to-One Reduction, All-to-All broadcast and reduction All-Reduce and prefix sum operations, scatter and gather, All-to-All personalized communication, circular shift, Improving the speed of some communication operation.

## **Unit – IV**

Analytical modeling of parallel programs: Performance metrics for parallel systems, Effect of granularity of performance, scalability of parallel system, Minimum execution time and minimum cost-optimal execution time, Asymptotic analysis of parallel programs, other scalability metrics.

## **Unit - V**

Programming using the message passing paradigm: Principle of message – Passing programming, Send and receive operations, The message passing interface, Topologies and embedding, Overlapping communication with computation, collective communication and computation operations, Groups and communicators.

Dense matrix algorithm: Matrix-vector multiplication, Matrix-matrix algorithm, Solving a system of linear equations.

## **Text Books:**

- 1) Introduction to Parallel Computing, Second Edition, Ananth Gram, Anshul Gupta, George Karypis, Vipin Kumar Person Education.
- 2) Parallel computing Theory and Practice, Second Edition, Michael J. Quinn, TMH.

## **BIGDATA ANALYTICS**

**Course Code: BCA343**

**L- 3, T-1, P-0, C-4**

### **Course contents:**

Introduction to Big Data; Big Data Architecture: Tradition Information Architecture, Integrated with Big Data Architecture Capabilities: Storage, Management, Database, Processing, Data Integration, Statistical Analysis; Large Scale File System: Distributed File System, Map Reduce, HDFS and Hadoop; Data Management Techniques to Store Data Locally and in Cloud Infrastructures; Data Analysis using Statistical Methods and Visualization; Statistics and Computational Predictive Analysis on data; Data-Intensive Computations on Cluster and Cloud Infrastructures using MapReduce; Mining of Big Data; Issues, Challenges and Opportunities in Big Data Management

### **References:**

1. Rajaraman, A., Ullman, J. D., Mining of Massive Datasets, Cambridge University Press, United Kingdom, 2012
2. Berman, J.J., Principles of Big Data: Preparing, Sharing and Analyzing Complex Information, Morgan Kaufmann, 2014
3. Barlow, M., Real-Time Big Data Analytics: Emerging Architecture, O Reilly, 2013
4. Schonberger, V.M. , Kenneth Cukier, K., Big Data, John Murray Publishers, 2013

## **ELECTIVE-II**

<b>SLNO.</b>	<b>SUBJECT CODE</b>	<b>SUBJECT NAME</b>
1	BCA330	Management Information System
2	BCA332	Mobile Computing
3	BCA334	Artificial Intelligence
4	BCA336	Information Security
5	BCA338	Network Programming
6	BCA340	Bio-Informatics
7	BCA342	Cloud Computing



# MANAGEMENT INFORMATION SYSTEM

Course Code: BCA330

L-3, T-1, P-0, C-4

**Objective:** The Management Information system is an idea which is associated with man, machine, marketing and methods for collecting information's from the internal and external source and processing this information for the purpose of facilitating the process of decision-making of the business. In this process, computer has added on more dimensions such as speed, accuracy and increased volume of data that permit the consideration of more alternatives in decision making process.

## Unit -I

**An Overview of Management Information Systems:** Types of information systems, Definition of a management information system, Concept of an MIS, MIS & Decision Support Systems.

## Unit -II

**Information System:** End user and Enterprise Computing, Computer Peripherals, Application software and System software, Technical foundation of database management, managing data Resources.

## Unit -III

**Foundation of Information Systems in Business:** Information system in business. The Components of Information system, Fundamentals of strategic advantage, Using Information for strategic advantage.

## Unit -IV

**Business Applications of Information Technology:** Internet & Business, Intranet, Extranet & Enterprise Solutions, Information System for Managerial Decision Support.

## Unit -V

**Managing Information Technology:** Managing Information Resources and technologies, Global information technology, Security and control Issues in Information system, ethical and societal challenges of IT.

**Text Books:**

4. Brian O., *Management Information System*, Tata McGraw Hill
5. Gordon B., Davis & Margrethe H. Olson, *Management Information System*, Tata McGraw Hill
6. Brian O., *Introduction to Information System*, McGraw Hill.

**References Books:**

5. Murdick, *Information System for Modern Management*, PHI.
6. Jawadekar, *Management Information System*, Tata McGraw Hill.
7. Jain Sarika, *Information System*, PPM
8. Davis, *Information System*, Palgrave Macmillan

\*Latest editions of all the suggested books are recommended.

# MOBILE COMPUTING

Course Code: BCA332

L-3, T-1, P-0, C-4

## Unit - I

Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signaling, Global System for Mobile Communication (GSM) System overview : GSM Architecture, Mobility management, Network signaling.

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard, Mobile IP.

## Unit - II

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML), Wireless Local Loop (WLL) : Introduction to WLL Architecture, wireless Local Loop Technologies.

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000

## Unit - III

Global Mobile Satellite Systems ; case studies of the IRIDIUM, ICO and GLOBALSTAR systems. Wireless Enterprise Networks : Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

Server-side programming in Java, Pervasive web application architecture, Device independent example application.

## Text Books:

1. Mobile Communication: J. Schiller, Pearson Education
2. Mobile Computing: P.K. Patra, S.K. Dash, Scitech Publications.
3. Mobile Computing: Talukder, TMH, 2<sup>nd</sup> Edition.

## Reference Books:

1. Pervasive Computing: Burkhardt, Pearson Education.
2. Principles of Mobile Computing: Hansmann, Merk, Springer, 2<sup>nd</sup> Edition.

# ARTIFICIAL INTELLIGENCE

Course Code: BCA334

L-3, T-1, P-0, C-4

## Unit - I

What is Artificial Intelligence? AI Technique, Level of the Model, Problem Spaces, and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs. Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-first Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis, **Knowledge Representation**: Representations and Mappings, Approaches to Knowledge Representation.

## Unit – II

**Using Predicate Logic**: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction. **Using Rules**: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge. **Symbolic Reasoning Under Uncertainty**: Introduction to Non-monotonic Reasoning, Logics for Non-monotonic Reasoning, Implementation Issues, Augmenting a Problem-solver, Depth-first Search, Breadth-first Search. **Weak and Strong Slot-and-Filler Structures**: Semantic Nets, Frames, Conceptual Dependency Scripts, CYC.

## Unit - III

**Game Playing**: The Minimax Search Procedure, Adding Alpha-beta Cutoffs, Iterative Deepening. **Planning**: The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning Other Planning Techniques. **Understanding**: What is Understanding, What Makes Understanding Hard?, Understanding as Constraint Satisfaction .

## Unit – IV

**Natural Language Processing**: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Statistical Natural Language Processing, Spell Checking.

## Unit - V

**Learning**: Rote Learning, Learning by Taking Advice, Learning in Problem-solving, Learning from Examples: Induction, Explanation-based Learning, Discovery, Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning. **Expert Systems**: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

## Text Books:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed., 2009

## References:

- 1) Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI., 2010
- 2) S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed. 2011

# INFORMATION SECURITY

Course Code: BCA336

L-3, T-1, P-0, C-4

## Unit - I

**Introduction to Information Security:** Security Goals, Attacks, Security Services and Mechanisms, **Mathematical Background:** Integer and Modular Arithmetic, Matrices, Linear Congruence. Groups, Rings, and Fields,  $GF(p)$ , Euclidean and Extended Euclidean Algorithms, Polynomial Arithmetic,  $GF(2^n)$ . Random Number Generation, Prime Numbers, Fermat's and Euler's Theorems, Primality Testing Methods, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Discrete Logarithms.

## Unit - II

**Traditional Encryption Methods:** Symmetric Cipher Model, Substitution Ciphers, Transposition Ciphers, Block and Stream Ciphers, Rotor Cipher, Steganography. **Symmetric Key Ciphers:** Data Encryption Standard, Advanced Encryption Standard. **Asymmetric Key Ciphers:** RSA Cryptosystem, ElGamal Cryptosystem, Elliptic Curve Cryptosystem.

## Unit - III

**Message Integrity, Authentication:** Message Integrity, Random Oracle Model, Message Authentication, MAC Algorithms. Cryptographic Hash Functions: MD Hash Family, Whirlpool, Secure Hash Algorithm. Digital Signature and Authentication: Digital Signature Schemes, Variations and Applications, Entity Authentication. Key Management: Diffie-Hellman Key Exchange.

## Unit - IV

**Network and System Security:** Security at the Application Layer: e-mail security, PGP and S/MIME. Security at the Transport Layer: Secure Socket Layer (SSL) and Transport Layer Security (TLS).

## Unit - V

Security at the Network Layer: IP Security. **System Security:** Malicious Software, Malicious Programs, Viruses, Worms, Malware, Intrusion Detection System, Firewalls.

### Text Books:

1. B. A. Forouzan & D Mukhopadhyay ,Cryptography and Network Security., McGraw Hill, 2nd ed.2010

### References:

1. B. Menezes ,Network Security and Cryptography., Cengage Learning, 1st ed.2010
2. Stallings ,Cryptography and Network Security., PHI, 4th ed.2010

# NETWORK PROGRAMMING

**Course Code: BCA338**

**L-3, T-1, P-0, C-4**

## **Course contents:**

Introduction to Network Programming: OSI reference model, TCP and UDP connection establishment and Format, Buffer sizes and limitation, standard internet services. Inter Process Communication: fork, wait and exec function. Pipes, FIFOs streams, and shared memory, semaphores and messages queues, Sockets Programming: Socket address format, TCP and UDP sockets – Socket, connect, bind, listen, and accept, concurrent servers and interactive servers. Signals handling: signal, sigaction. signal masking. signal generation: kill, alarm. Interactions of signal and wait, server process termination, I/O Multiplexing and socket options: I/O Models, select function. Threads: threaded servers – thread creation and termination, Remote Procedure calls. Practical: using C in LINUX/UNIX

## **References:**

1. W. Richard Stevens, UNIX Network Programming – The Sockets Networking API, Vol. 1, 3rd Ed. Pearson Education, 2004
2. W. Richard Stevens, UNIX Network Programming – Interprocess Communications, Vol. 2, 2nd Ed, Pearson Education, 2004
3. Chris Brown, UNIX Distributed Programming, PHI,
4. UNIX Systems Programming using C++ T CHAN, PHI. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

# BIOINFORMATICS

Course Code: BCA340

L-3, T-1, P-0, C-4

## Unit - I Introduction to bioinformatics and data generation :

What is bioinformatics and its relation with molecular biology. Examples of related tools(FASTA, BLAST, BLAT, RASMOL), databases(GENBANK, Pubmed, PDB ) and software(RASMOL,Ligand Explorer). Data generation; Generation of large scale molecular biology data. (Through Genome sequencing, Protein sequencing, Gel electrophoresis, NMR Spectroscopy, X-Ray Diffraction, and microarray). Applications of Bioinformatics.

## Unit - II Biological Database and its Types

Introduction to data types and Source. Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite, and Secondary). Specialized Genome databases: (SGD, TIGR, and ACeDB). Structure databases (CATH, SCOP, and PDBsum)

## Unit - III Data storage and retrieval and Interoperability

Flat files, relational, object oriented databases and controlled vocabularies. File Format (Genbank, DDBJ, FASTA, PDB, SwissProt). Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search. The challenges of data exchange and integration. Ontologies, interchange languages and standardization efforts. General Introduction to XML, UMLS, CORBA, PYTHON and OMG/LIFESCIENCE.

## Unit - IV Sequence Alignments and Visualization

Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm). Methods for presenting large quantities of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol), Anatomical visualization.

## Unit - V Gene Expression and and Representation of patterns and relationship

General introduction to Gene expression in prokaryotes and eukaryotes, transcription factors binding sites. SNP, EST, STS.Introduction to Regular Expression, Hierarchies, and Graphical models (including Marcov chain and Bayes notes). Genetic variability and connections to clinical data.

## References:

- 1) Neil C. Jones and Pavel A. Pevzner, An Introduction to Bioinformatics Algorithms, MIT Press, 2004.
- 2) Bioinformatics Algorithms, Techniques & Applications – Wiley Inter Science
- 3) Wing-Kin Sung, "Algorithms in Bioinformatics: A Practical Introduction", CRC Press (Taylor & Francis Group), 2009.
- 4) Ion Mandoiu, Alexander Zelikovsky, Bioinformatics Algorithms: Techniques and Applications Wiley, 2008.

# CLOUD COMPUTING

Course Code: BCA342

L-3, T-1, P-0, C-4

## UNIT - I

**Cloud Computing Fundamentals:** Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, Cloud Sim.

## UNIT - II

### Cloud Services and File System

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service- Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

## UNIT - III

### Collaborating With Cloud

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

## UNIT - IV

### Virtualization

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

### Hardware and Infrastructure

Clients, Security, Network, Services. Accessing the Cloud – Platforms, Web Applications, Web APIs, Web Browsers. Cloud Storage – Overview, Cloud Storage Providers, Standards – Application, Client, Infrastructure, Service.

## UNIT - V

### Security in the Cloud

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.



**Text Books:**

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3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

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1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009. Kumar Saurabh, "Cloud Computing – insights into New -Era Infrastructure", Wiley India,2011.
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