

**MATS UNIVERSITY**  
**BACHELOR OF COMPUTER APPLICATION (BCA)**  
**REGULATIONS**

**Introduction**

The main objective of this program is to inculcate among the students, the technical as well as the theoretical knowledge about the computers and its various applications in the different fields. This program is designed in such a way that the students can have a detailed knowledge of the subjects as well as the knowledge of the IT related applications. Throughout this program the students will go through the IT scenario, its scope, career and the essentials of the IT world. The students will be given chance to interact with the Corporate and other intellectuals in the field so as to enable them to grasp theoretical as well as technical knowledge from them and enhance their personality, skill and knowledge. The students will make use of the 24 hours internet facility and video conferencing to interact with the people in the IT field and share their knowledge and experience.

**Program Objectives:**

- To equip the students to meet the requirement of Corporate world and Industry standard.
- To engage in professional development and to pursue post graduate education in the fields of Information Technology and Computer Applications
- To provide the students about computing principles and business practices in software solutions, outsourcing services, public and private sectors

**Program Outcome:**

- Understand the concepts of key areas in computer science.
- Analyze and apply latest technologies to solve problems in the areas of computer applications.
- Analyze and synthesis computing systems through quantitative and qualitative techniques.
- Apply technical and professional skills to excel in business.
- Communicate effectively in both verbal and written form.
- Develop practical skills to provide solutions to industry, society and business.

**1. Scope and Content**

- 1.1 The regulations documented here are applicable to the B.C.A. programme offered by the university.
- 1.2 The applicability of the Regulations must be understood in the context of the given Scheme of study and the Syllabus of the programme.
- 1.3 The Regulations given here are in addition to the rules and regulations notified at the time of the admission.
- 1.4 The authorities of University may modify, add, delete, expand or substantiate any part of the Regulations and syllabi, at any time.

**2. Course Content**

The programme shall be for duration of six semesters, spread out in three years. Each semester of the programme shall consist of either all or some of the following components:

- 2.1 Core Subjects
- 2.2 AECC (Ability Enhancement Compulsory Course)
- 2.3 SEC( Skill Enhancement Course)
- 2.4 DSE( Discipline Specific Electives ) /Choice Based
- 2.5 GE( Generic Electives)
- 2.6 Lab Course
- 2.7 Project Work/

**2.1 Core Subjects**

Core subjects comprises of subjects that form an integral part of the programme. These subjects provide a strong ground in basic disciplines of study.

**2.2 AECC (Ability Enhancement Compulsory Course)**

The students who have not done English up to class XII are to opt for Hindi Communication. They can opt Environment studies and other languages also .

### 2.3 SEC( Skill Enhancement Course)

This will facilitate student mobility across institutions within and across countries and also enable potential employers to assess the performance of students.

### 2.4 DSE ( Discipline Specific Electives) /Choice Based

Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study)

### 2.5 GE( Generic Electives)

An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

### 2.6 Lab Courses

These subjects are totally practical-based subjects. The learning of these subjects will be performed in laboratories/practical sites with equipments/resources. These subjects shall support the practical implementation of the core/core-bracket subjects. The processes of evaluation of their subjects will depend on the nature of that individual subject.

### 2.7 Project Work

The project work shall be done for a duration as specified by the Coordinator, in the area, related to the main subject of study or the specialization. The project work shall give the student an insight to the situations existing in the field/related/industries, etc.

## 3 Eligibility for Admission and Mode of Selection

- 3.1 The minimum qualification required to be eligible for admission is a pass in the HSC or 10+2 examination of a Board of a State Government, or a course recognized as equivalent thereto by the University, desirably with the relevant or related subjects as one of the subjects of study.
- 3.2 The method of selection for the course shall normally be by means of a Personal interview. However, the admission might also be by means of an entrance test.

## 4 Attendance and Examination

A student is eligible to appear for the term-end examinations, only if he/she has put in a minimum of 75% attendance in each subject individually.

## 5 Assessment and Examination

### 5.1 Credits

Credit Points will be awarded for all the subjects. One credit is equivalent to ten classroom contact hours.

Each core subjects will carry either 6 or 4 or 2 credits, each core bracket subject will carry 3 credits and practical courses will carry either 6 or 4 or 2 credits depending on the number of hours of teaching and training.

### 5.2 Pattern of Assessment

Assessment of student's performance will be based on two components i.e. Internal Assessment and Term-end Examination conducted at the end of each semester.

A six-credit subject will comprise of an Internal Assessment component of 30 marks and a Term-end Examination components of 70 marks.

A four-credit subject will comprise of an Internal Assessment component of 30 marks and a Term-end Examination components of 70 marks.

A two-credit subject will comprise of an Internal Assessment component of 15 marks and a Term-end Examination components of 35 marks.

### 5.3 Purpose of Internal Assessment

The Term-end Examination will be conducted as per the University regulations. Sessional tests, assignment, mid-term examination, etc. will be conducted in each subject during the course of each semester, for the.

### 5.4 Assessment for Core Bracket Subjects

Depending on the participation and performance of students, the faculty of the Core Bracket subject will grade the student in term of a eight-point scale as given below:

Marks Secured	Grade Point	Letter Grade
80 and above	10	Outstanding(O)
70 and above but below 80	9	Excellent (A+)
60 and above but below 70	8	Very Good (A)
55 and above but below 60	7	Good (B+)
50 and above but below 55	6	Above Average (B)

45 and above but below 50	5	Average (C)
40 and above but below 45	4	Pass(P)
Below 40	0	Fail (F)
	0	Absent (AB)

This assessment is purely based on internal assessment of the subject faculty/coordinator.

### 5.5 Assessment of Project Work

The project work will carry a total of 100 marks. Of this, 70% marks are for the external examination and 30% marks will be awarded for internal evaluation

### Eligibility to Appear for the Term-End Exam

Students, who have put in a minimum of 75% attendance in each subject, shall be eligible to appear for the Term-end examination.

## 6 Eligibility for Pass

- 6.1 A student shall be declared to have passed in a subject, if he/she secures at least 40% marks in the term-end examination and an aggregate of 40% including internal assessment.
- 6.2 When a student reappears for the failed subject(s), the internal assessment marks originally secured by him/her in the first appearance in the subject(s), if any, will be carried forward.
- 6.3 A student shall be declared to have passed in Core Bracket subject, if he/she secures at least a pass grade.
- 6.4 Promotion of the student to the next semester, is not automatic, but is dependent on certain other conditions.

## 7 Classification of Successful Students

7.1 On successful completion of the programme, the students will be classified as below:

Distinction	Those securing an aggregate marks of 75% and above in all the subjects;
First Class	Those securing an aggregate mark of less than 75%, but above 60% in all the subjects;
Second Class	Those securing an aggregate mark of less than 60%, but above 50% in all the subjects;
Pass	Those securing an aggregate mark of less than 50% in all the subjects;

### 7.2 Ranks

Only students who have passed each of the semester examination at the first appearance, shall be eligible for award of Ranks. The first three ranks shall be notified.

## 8 Award of Qualification

Students will be awarded the Bachelor Degree of B.C.A., upon fulfillment of the following criteria:

- a. Must have passed all the subjects of the six semester with a minimum of 40% in each subject including Internal assessment and secured 45% in aggregate;
- b. Must have secured at least a pass grade in all the Core Bracket subjects.
- c. Must have secured a minimum of 45% marks in the project work (wherever applicable).
- d. Must have complied with all other assessment guidelines and criteria notified during the conduct of the programme.

## 9 Maximum period for the complement of the Programme

The maximum period for the completion of the programme shall be five years from the date of joining the programme.

## 10 General Guidelines

### 10.1 Academic Integrity and Ethics

- a. A students who has committed an act of academic dishonesty will be deemed to have failed to meet a basic requirement of satisfactory academic performance. Thus, academic dishonesty is not only a basic for disciplinary action but also is relevant to the evaluation of student's level of performance and progress.
- b. Where there has been violation of the basic ethos and principles of academic integrity and ethics, the Director/Board of Examiners/Course coordinator may use their discretion in terms of disciplinary action to be taken.
- c. Academic dishonesty includes, but is not necessarily limited, to the following:
  - i. Cheating or knowingly assisting another student in committing a act of cheating;
  - ii. Unauthorized possession of examination materials, destruction or hiding of relevant materials;
  - iii. Act of plagiarism;
  - iv. Unauthorized changing of marks or marking on examination records

## **10.2 Attendance**

- a. Student are required to attend and participate in all scheduled class sessions, guest lecturer, workshops, outbound learning programs and club/ forum activities of both academic and non-academic nature.
- b. Students may be dropped from the programs due to excessive and non-intimated absences.
- c. Students must notify the program coordinator in writing, the reasons for absence, if any, from class sessions, activities and assessment components.
- d. On notification of absences ( including anticipated absences) , the Director/ Programmer coordinator would determine whether the absences could be rectified or whether it is possible to satisfactorily complete the subject with the number of identified absences.

## **10.3 General**

- a. The students are expected to spend a considerable amount of time in research, reading and practice.
- b. All students are expected to develop and maintain a positive profession at titude and approach throughout the Programme and in conduct of all other activities.
- c. Attendance alone is not sufficient. Students are expected to participate, to help the class learn and understand the topics under consideration.
- d. Food and drinks are not permitted in the classroom/ conference hall.
- e. All students are expected to dress as per stipulated dress code.

<b>BACHELOR OF COMPUTER APPLICATION - BCA</b>						
<b>SEMESTER -I</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
BCA101	PROGRAMMING IN 'C'	4	3+1+0	70	30	100
BCA102	FUNDAMENTALS OF COMPUTER	4	3+1+0	70	30	100
BCA103	QUANTITATIVE METHODS	6	5+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
BCA104	ENVIRONMENTAL STUDIES	2	1+1+0	35	15	50
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
BCA105	OFFICE AUTOMATION CERTIFICATION	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
BCA106	PROGRAMMING IN 'C' LAB	2	0+0+2	35	15	50
BCA107	FUNDAMENTALS OF COMPUTER LAB	2	0+0+2	35	15	50
		<b>26</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF COMPUTER APPLICATION - BCA</b>						
<b>SEMESTER -II</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
BCA201	OBJECT ORIENTED PROGRAMMING - C++	4	3+1+0	70	30	100
BCA202	RELATIONAL DATA BASE MANAGEMENT SYSTEM	4	3+1+0	70	30	100
BCA203	SOFTWARE ENGINEERING	6	5+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
BCA204	COMMUNICATIVE ENGLISH	2	1+1+0	35	15	50
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
BCA205	DESKTOP PUBLISHING	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
BCA206	OBJECT ORIENTED PROGRAMMING - C++ LAB	2	0+0+2	35	15	50
BCA207	RELATIONAL DATA BASE MANAGEMENT SYSTEM LAB	2	0+0+2	35	15	50
		<b>26</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF COMPUTER APPLICATION - BCA</b>						
<b>SEMESTER -III</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
BCA301	DATA STRUCTURE USING C++	4	3+1+0	70	30	100
BCA302	COMPUTER GRAPHICS	4	3+1+0	70	30	100
BCA303	DISCRETE MATHEMATICS	6	5+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
BCA304	ENTERPRENEURSHIP	2	1+1+0	35	15	50
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
BCA305	COMPUTATIONAL ACCOUNTING STATISTICAL TOOLS	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
BCA306	ALGORITHM AND DATA STRUCTURE USING C++ LAB	2	0+0+2	35	15	50
BCA307	COMPUTER GRAPHICS LAB	2	0+0+2	35	15	50
		<b>26</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF COMPUTER APPLICATION - BCA</b>						
<b>SEMESTER -IV</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
BCA401	PROGRAMMING USING VB .NET	4	3+1+0	70	30	100
BCA402	Principal of operating system & Linux concept	4	3+1+0	70	30	100
BCA403	Data Communication and Network	6	5+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
BCA404	MINI PROJECT	2	1+1+0	35	15	50
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
BCA405	CLIENT SERVER ARCHITECTURE IMPLEMENTATION AND NETWORK TROUBLE SHOOTING	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
BCA406	PROGRAMMING USING VB .NET LAB	2	0+0+2	35	15	50
BCA407	OPERATING SYSTEM LAB	2	0+0+2	35	15	50
		<b>26</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF COMPUTER APPLICATION - BCA</b>						
<b>SEMESTER - V</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
BCA501	PROGRAMMING IN CORE JAVA	4	3+1+0	70	30	100
BCA502	WEB DESIGNING	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
BCA503	ELECTIVE I	4	3+1+0	70	30	100
BCA504	ELECTIVE II	4	3+1+0	70	30	100
BCA505	INDUSTRIAL/COMPANY/ PROFESSIONAL TRAINING	4	0+0+4	70	30	100
<b>GE( GENERIC ELECTIVES)</b>						
<b>LAB COURSES</b>						
BCA506	CORE PROGRAMMING IN JAVA LAB	2	0+0+2	35	15	50
BCA507	WEB DESIGNING LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>420</b>	<b>180</b>	<b>600</b>

<b>BACHELOR OF COMPUTER APPLICATION - BCA</b>						
<b>SEMESTER - VI</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
BCA601	ADVANCED JAVA PROGRAMMING	4	3+1+0	70	30	100
BCA602	INTRODUCTION TO MICROSOFT .NET FRAMEWORK AND C#	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
BCA603	ELECTIVE III	4	3+1+0	70	30	100
BCA604	ELECTIVE IV	4	3+1+0	70	30	100
BCA605	SYSTEM DEVELOPMENTPROJECT (SYSTEM DESIGNAND IMPLEMENTATION)	4	0+0+4	70	30	100
<b>GE( GENERIC ELECTIVES)</b>						
<b>LAB COURSES</b>						
BCA606	ADVANCED JAVA PROGRAMMING LAB	2	0+0+2	35	15	50
BCA607	INTRODUCTION TO MICROSOFT .NET FRAMEWORK AND C# LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>420</b>	<b>180</b>	<b>600</b>

## Programming in 'C'

### COURSE OBJECTIVES

This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code. The nature of C language is emphasized in the wide variety of examples and applications. To learn and acquire art of computer programming. To know about some popular programming languages and how to choose Programming language for solving a problem.

**COURSE OUTCOME** Upon successful completion of this course, students will be able to

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers and Structures.
- Use different data structures and create/update basic data files.

**MODULE I:** Overview of C: History of 'C', Structure of 'C' program. Data types Int, float, char, double, void, Data structures. Constants and Variables: Variable declaration - integer, real, float, character, logical variables, string variables, Constants, Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Expressions, Control Constructs: If-then, For, While. Arrays: Array declaration, One and Two dimensional arrays. Functions - Fundamentals: General form, Function arguments, returns value. Basic I/O: Formatted I/O, Unformatted I/O. Advanced features: Type modifiers and storage class specifiers for data types, various operators, Type casting, type conversion

**MODULE II:** Control Constructs: Do-while, Switch statements, Break and continue, Exit () function, Go to and label. Scope rules: Local and Global variables, scope rules of functions. Functions : Parameter passing, call-by-value and call-by-reference, calling functions with arrays, argc and argv, Recursion: Basic concept, design

**MODULE III:** Pointers: & and \* operators, Pointer expression, pointer assignments, pointer ,arithmetic, pointer comparison, dynamic allocation functions -malloc and calloc, pointers vs. Arrays, Arrays of pointer, pointers to pointers, initializing pointers, pointers to functions, function returning pointers, functions with variable number of arguments.

**MODULE IV:** Structures : Basic of structures, declaring a structure, referencing structure elements, arrays of structures, passing structure to functions, passing entire structure to functions, structure pointers declaring a structure pointer, using structure pointers, arrays and structure within structure, uses. Unions: declaration, uses, enumerated data types, typedef,

**MODULE V:** File handling: file pointer, file accessing functions, fopen, fclose, putc, getc, fprintf, C preprocessor, #define, #include, #undef, #conditional compilation directives, #if, #else, #elif, #endif, #ifdef and #ifndef, C standard library and header files : header files, stdio.h, ctype.h, string.h, math.h, stdlib.h, etc., standard library functions, string functions, mathematical functions, date and time function.

### Text Books:

- |                                 |                                                                           |
|---------------------------------|---------------------------------------------------------------------------|
| 1. Programming in C             | Yashwant Kenetkar                                                         |
| 2. Programming in 'C'           | Venugopal                                                                 |
| 3. The C Programming Language   | Kernigham and Ritche [Prentice Hall]                                      |
| 4. Application Programming in C | Richard Johnson-baugh& MartinKalin                                        |
| 5. The Spirit of C              | Macmillan International Editions, Mullish Cooper, Jaico Publishing House. |
| 6. How to solve it by Computers | R.G.Dromey, Prentice Hall of India.                                       |
| 7. Mastering in CPP             | Venugopal                                                                 |

### Reference Books:

- |                                      |                                                  |
|--------------------------------------|--------------------------------------------------|
| 1. The art of C Programming          | Jones, Robin & Stewart, Narosa Publishing House. |
| 2. C Problem solving and Programming | A. Kenneth, Prentice Hall International.         |
| 3. C made easy                       | H.Schildt, McGraw Hill Book Co.                  |



**BCA102**  
**Fundamentals of Computers**

**Course Objective:**

The objective of the course is to introduce the concepts of computer fundamental & their applications for the efficient use of office technology.

**Course Outcome:**

- Student will be able to identify various important parts of computer device.
- Student will be able To find right kind of storage device.
- Student will get hands on experience for basic application software
- Demonstrate the practices in data & file management.

**MODULE I:** Computer System Characteristics and Capabilities: Speed, Accuracy, Reliability, Memory capability, Repeatability. Computer Hardware and Software: Block Diagram of a Computer, Different Types of Software's. Data Processing: Data, Data Processing System, Storing Data, Processing Data. Types of Computers: Analog, Digital, Hybrid General and Special Purpose Computers. Computer Generations: Characteristics of Computer Generations Computer Systems – Micros, Minis & Main-frames. Introduction to a PC: The IBM Personal Computer Types of PC systems PC, XT & AT Pentium PC's Limitations of Micro Computer.

**MODULE II:** Introduction to Input Devices: Categorizing Input Hardware, Keyboard, Direct Entry – Card Readers, Scanning Devices – O.M.R., Character Readers, MICR, Smart Cards, Voice Input Devices, Pointing Devices – Mouse, Light Pen. ). Computer Output :Output Fundamentals, Hardcopy Output Devices, Impact Printers, Non-Impact Printers, Plotters, Computer output Microfilm/Microfiche(COM) systems, Softcopy Output Devices, Cathode Ray Tube, Flat Screen Technologies.

**MODULE III:** Storage Devices :Storage Fundamentals, Primary and Secondary Storage, Data Storage and Retrieval Methods – Sequential, Direct & Indexed Sequential, Tape Storage and Retrieval Methods Tape storage Devices, characteristics and limitations, Direct access Storage and Microcomputers - Hard Disks, Disk Cartridges, Direct Access Storage Devices for large Computer systems, Mass storage systems and Optical Disks, CD ROM. Central Processing Unit : The Microprocessor, control unit, A.L.U., Registers, Buses, Main Memory, Main Memory (RAM) for microcomputers, Read Only Memory(ROM)

**MODULE IV:** System Software :System software Vs. Application Software, Types of System Software, Introduction and Types of Operating Systems programs, Booting Loader, Diagnostic Tests, Operating Systems Executive, BIOS, Utility Programs, File Maintenance, Language Processors, Assembler, Compiler & Interpreter. Application Software: Microcomputer Software, Interacting with the System, Trends in PC software, Types of Application Software, Difference between Program and Packages.

**MODULE V:** Introduction, History and Version of DOS, Fundamentals of DOS: Physical Structure of the Disk, Compatibility of drives, Disks & DOS versions, Preparing Disks for use, Device Names. Getting Started with DOS : Booting Process, System Files and Command.com, Internal DOS Commands - DIR, MD, CD, COPY, DEL, REN, VOL, DATE, TIME, CLS, PATH, TYPE. Files & Directories, Elementary External DOS Commands - CHKDSK, MEM, XCOPY, PRINT, DISKCOPY, DISKCOMP, DOSKEY, HELP, TREE, SYS, LABEL, ATTRIB, Creating a Batch Files, Additional Commands - ECHO, PROMPT, MODE, GRAPHICS, EDIT, FORMAT, FDISK, BACKUP, RESTORE, MORE, SORT, APPEND.

**Text Books:**

- |                              |                                    |
|------------------------------|------------------------------------|
| 1. Using IT                  | - Williams- T M Hill               |
| 2. Fundamental of computers  | - ChetanSrivastav                  |
| 3. 'O' level                 | - V. K. jain                       |
| 4. Fundamentals of Computers | - V. Rajaraman Prentice-Hall India |

**BCA103**  
**Quantitative Methods**

**Course objective**

Mathematics concepts and notation are useful in studying and describing objects and problems in computing algorithms and programming language in different computer domain application.

**Course Outcome:**

- Data handling in matrix and evaluation.
- Student will understand derivative method
- Student learn basic statistical concept.

**MODULE I:** Averages, Percentage, Ratio, Proportion, Permutation and Combinations, Definition of Matrix, Types of Matrices, Addition and Subtraction of Matrices, Scalar Multiplication and Matrix Multiplication, Determinants, Calculation of Value of Determinants Up to Third Order, Adjoint of A Matrix, Finding Inverse Through Adjoint of a Matrix, Solution of a System of Linear Equations Using Matrix & Determinates Methods (Up To Three Variables.)

**MODULE II:** Calculus: Functions Definition and Types, Derivatives of Some Standard Functions, Differentiation of Functions of Function, Product of Functions, Function in Quotient Form, Logarithmic Differentiation, Higher Order Derivatives and Their Uses, Maxima and Minima. Integration: Definition, Integration of Some Standard Functions, Substitution in integration, Definite Integral.

**MODULE III:** Introduction to Statistics, Frequency Distribution, Measures of Central Tendency, Arithmetic Mean, Median, Mode, Quartiles, Deciles, Percentiles. Measure of Dispersions: Range, Mean Deviation, Interquartile Range, Standard Deviation, Coefficient of Variations.

**MODULE IV:** Measures of Relation: Meaning, Definition and Use of Correlation- Types of Correlation: Karl Pearson's Correlation Coefficient, Spearman's Rank Correlation, Regression Analysis, Regression Equations - Interpretation of Regression Coefficients

**MODULE V:** Probability–Basic Concepts of Probability, Multiplication and Addition Theorem of Probability, Conditional Probability, Bayes Theorem, discrete Random Variables, Expected Value & Variance of Random Variables.

**Text Books:**

- |                                       |   |                          |
|---------------------------------------|---|--------------------------|
| 1. Business Mathematics               | - | D.C Sancheti, V.K Kapoor |
| 2. Mathematics and statistics         | - | Suranjan Saha            |
| 3. Statistics for Management          | - | Levin Rubin              |
| 4. Statistical Method                 | - | S.P. Gupta               |
| 5. Quantitative Methods               | - | D R Agrawal              |
| 6. Statistics: Theory and Application | - | D C Sancheti, VK Kapoor  |
| 7. Fundamentals of statistics         | - | D N Elhance              |

**Reference Books:**

- |                                      |   |                               |
|--------------------------------------|---|-------------------------------|
| 1. Business Mathematics              | - | D.R Agrawal                   |
| 2. Quantitative Methods for Business | - | Anderson Sweeney, William 8/e |
| 3. Fundamentals of statistics        | - | D N Elhance                   |
| 4. Business Mathematics              | - | Sanchethi and Kapoor          |
| 5. Business Mathematics              | - | S.M Shukla                    |

**Environmental Studies**

**Course Objective**

Expose the basic concept of environment-resource, pollution, management and law and discussing issues endangering life on earth.

**Course Outcome**

Student will

- Understand basic principle of science which govern natural resources
- Understand resource management and sustainability conflict
- Understand human interference in natural environment

**MODULE I:** Multidisciplinary nature of environmental studies, Definition, scope and importance Natural Resources: Renewable and non-renewable resources.

**MODULE II:** Environmental Pollution Definition: Cause, effects and control measure of - Air pollution, water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

**MODULE III:** Ecosystem: Structure and function of an ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

**MODULE IV -**, Water conservation, global warming, acid rain, and ozone layer depletion,. Environment and human health, Women and Child Welfare. Role of Information Technology in Environment and human health

**MODULE V:** Biodiversity: - Definition, Types, and Value of biodiversity: Hot-spots of biodiversity. Threats to biodiversity: Conservation of biodiversity:

**Reference Books:**

1. Agarwal K.C. 2001 Environmental Biology Nidi Publ. Ltd. Bikaner.
  2. Bharucha Erach, the Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad 380 013, India, Email: mapin@icenet.net(R)
  3. Bruinner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
  4. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB).
  5. Cuningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 200,
  6. Dr A.K. Environmental Chemistry, Wiley Estem Ltd.
  7. Down to Earth, Centre for Science and Environment (R)
  8. Gloick, H.P. 1993 Water in crisis, Pacific Institute for studies in Deve, Environment & Security. Stockholm Eng. -Institute. Oxford Univ, Press. 473p.
  9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai (R).
  10. Heywood, V.H. & Watson, RT. 1995 Global Biodiversity Assessment, Cabridge Univ. Press 1140p.
  11. Jadhav H. &Bhosale, V.H. 1995, Environmental Protection and Laws. Himalaya Pub.House. Delhi 284p.
  12. Mckinney M.L. & School RM. 1996, Environmental Science systems & Solutions, Web enhanced edition, 639p.
  13. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB).
  14. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB).
  15. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
  16. Rao M.N. &Datta, A.K. 1987, Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd.
  17. Sharma B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
  18. Survey of the Environment, TheHidu (M).
  19. Townsend C., Harper J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB).
  20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol.I and II, Environment Media (R).
  21. Trivedi RK., and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
  22. Wagner K.D., 1998, Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p.
- (M)Magazine (R)Reference (TB) Textbook.

**BCA105**  
**OFFICE AUTOMATION CERTIFICATION**

**BCA201**  
**Object Oriented Programming - C++**

**Course Objective**

Developing programmatic solution for real problems by developing object oriented software using class encapsulation and inheritance. It will be based on basic knowledge of algorithms and procedural programming language.

**Course outcome**

- Student will understand fundamental concept of OOP
- Student will be able to apply object oriented programming in problem solving
- Student will be able to design applet and event handling mechanism in programs

**MODULE I:** Object Oriented Concepts, Origins of Object-Oriented Design, Object Oriented design concepts, Object Oriented Design methods, class and object definition, Refining Operations, Program Components and Interfaces, Annotation for object-oriented Design. Evolution of OOP, OOP Paradigm, and Advantages of OOP, Comparison between Functional Programming and OOP Approach, Characteristics of Object Oriented Language-objects, Classes, Inheritance, Reusability, User defined Data Types, Polymorphism, and Overloading. Introduction to OOP and C++: Advantages of OOP, Need of object-oriented programming, characteristics of object-oriented languages, C++ and C.

**MODULE II:** Introduction to C++, Identifier and keywords, Constants, Basic program construction, input/output using cin/cout, Preprocessor Directives, Comments, integer, character, float data types manipulators, Arithmetic operators, Library functions, Variable declaration, statements, expressions, features of iostream.h and iomanip.h., input and output., conditional expression loop statements, breaking control statements C++ Operators., type conversion, Defining a function., types of functions, Structure, Enumerated Data Types., simple functions, Passing arguments to and returning values from functions, Reference Arguments, Overloaded functions, Inline functions, Default Arguments, Variable and Storage classes, Returning by reference, Storage class specifier, recursion, Arrays, structures, pointers and structures, unions

**MODULE III:** Classes, member functions, objects, Specifying & using class & object, Constructors, copy constructors, public, private & protected, objects as function arguments Array Fundamentals, Arrays as class member data, Arrays of objects., strings, overloading Unary & Binary operators, Data conversion, Pitfalls of overloading & Conversion, Arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, and dynamic memory allocation, Inheritance, Class hierarchy, derivation, Derived class and their constructs, overriding member functions, class hierarchies, Public & Private Inheritance, Inheritance levels

**MODULE IV:** Polymorphism, compile time and runtime polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading., Parametric polymorphism., virtual functions., pure virtual functions., Strings, dynamic memory allocation., pointer to objects, new-delete, Linked-Lists, Persistent objects., Streams and files., Virtual, friend and static function, the this pointer, streams, string, character, object I/O, I/O with Multiple objects, File pointers, Disk I/O with member function, Error Handling

**MODULE V:** Generic function – template function., function name overloading, container classes, member access control, container types, the array string, the ordered collection, the stack, the queue., iteration methods, linked list of objects, creating a container class, Exception handling and Namespaces.

**Text Books:**

1. Robert Lafore, “Object Oriented Programming in Turbo C++”, Galgotia Publications, 1994.

**Reference Books:**

1. D. Ravichandran, “Programming with C++”, TMH, 1996.

2. Bjarne Strastrup, "The C++ Programming Language", Addison-Wesley Publication Co., 1995.
3. Object Oriented Programming in C++: Barkakati, Nabajoti (Prentice Hall of India) 1996
4. D. Parsons, "Object Oriented Programming with C++", BPB Publication.
5. Schildt Herbert, "C++: The Complete Reference", 4th Ed., Tata McGraw Hill, 1999
6. "Programming C++" by Yeshwanth Kanetkar

**BCA 202**  
**Relational database Management System**

**Course objective**

Student understand and use relational database system to organize and store data in computer. Course objective is to provide concept of functional dependencies and normalization and basic SQL operation.

**Course Outcome**

- Student will be able to construct ER Diagram
- Role of relational algebra in developing good database.
- Student will be able to normalize data and reduce redundancy
- Create table and write basic query method

**MODULE I:** Database and Database User, Database System Concepts and Architecture, Data Modeling Using the Entity Relationship Model; Enhanced Entity-Relationship and Object Modeling

**MODULE II :** Relational Model, Language and Systems,, Relational Data Model, Relational Constraints and the Relational Algebra, Tuples, Relational Algebra, Operators used in Relational Algebra, SQL, Queries, Aggregate Function,, group by operator. SQL-The Relational Database Standard, Examples of Relational Database Management Systems: Oracle and MS Access.,

**MODULE III:** Object-Oriented and Extended Relational, Database Technology, Concepts for Object-Oriented Database, Object Database Standards, Languages and Design, Object Relational and Extended Relational Database System

**MODULE IV:** Database Design, Theory and Methodology, Functional Dependencies and Normalization for Relational Databases,, Practical Database Design and Tuning Good and Bad Decomposition, Normalization Functional Dependency 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, NF and BCNF, Multi-valued Dependency, 4 NF, Join Dependency, PJNF(5NF), Introduction to File organization, Organization of records in files, Data dictionary storage, ordered indices,, B+ Tree, B- Tree index files, Static, Dynamic Hashing, and Comparison of ordered indexing and Hashing.,

**MODULE V:** Operational Database, Information and Knowledge, Introduction to ODBC concept,, ORACLE Philosophy, SQL Plus, create, alter, insert, update, delete, select, group by, order by, having, grant privileges, aggregate function, Views, join concept, set operations. PL/SQL, Syntax, Data Types, Execution Environment; Stored Procedures and Functions, Error Handling in PL/SQL; Cursors; Database Triggers;

**Suggested Books:**

1. Data Base Management System - Alexis & Mathews [Vikas publication]
2. Database System - Henry Korth
3. Database System - Bipin Desai
4. Database System - C.J. Date
5. Oracle and Developer 2000 - Ivan Bayross

**Text Books:**

1. Fundamentals of Database Systems, Author: RamezElmeZElmasri and Shamkant 2. B.Navathe - Third Edition, ISBN : 981-4050-9, Publisher:Addition-Wesley.
3. H. F. Korth and A. Silberschatz: Database Systems & Concepts, McGrawHill Publications.

**Reference Books:**

1. R. Elmasri, S. B. Navathe: Fundamentals of Database Systems, Benjamin/Cummings Publishing Company.
2. Stefano Ceri, G. Pellagatti: Distributed Databases Principles & Systems, McGrawHill.

**BCA 203**  
**Software Engineering**

**Course Objective**

Course aim is to give basic theory of software engineering to apply group software development project.

**Course Outcome**

- Student will select most desirable software development model
- Apply standard coding
- Understand software requirement specifications for different projects.
- Understand object oriented software development
- Software reuse and reengineering

**MODULE I:** Software: Characteristics, Components and Applications. Software Engineering – A layered Technology, The Software process, Software Process models, Linear Sequential Model, Prototyping Model, RAD Model and Evolutionary Software models.

**MODULE II:** Software Process & Project Metrics: metrics in Project & Process Domains, Software Measurement and Metrics for Software Quality. Project Planning Objectives: Software Scope, resources.

**MODULE III:** Risk Management: Software risks, Risk Identification, Projection. Software Quality Assurance, Software reviews, Formal approach to SQA, Software Reliability, The SQA plan.

**MODULE IV:** Analysis concepts & Principles, Software prototyping, Specifications, Analysis Modeling, Design concepts, principles & Methods, System Testing, Methods

**MODULE V:** Object oriented Software Engineering: Object oriented Analysis, Object Oriented Design & Testing, Software Reuse, Reengineering,

**Case studies with related topics.**

**Text Books:**

- Software Engineering, A Practitioner's Approach by Rojer S Pressman, Fourth Edition, McGraw Hill.

**Reference Book**

- Software Engineering – LanSommerville, Pearson Education.

## **BCA 204 Communicative English**

**Course Objective**

Course objective is to give understanding of communication. Help in abstract preparation, project reports and basic communication letter

**Course Outcome**

- Student will understand objective of communication and various media.
- Student will be able to write technical proposal
- Student will be able to draft memo and other official document
- Student will be able to understand interview skill

**MODULE I:**

- What is Communication (An introduction)
- The Communication Process (communication cycle)
- Objectives of communication (types)
- Media of communication (oral, written, audio, audiovisual, face to face)
- Types of communication (Downward, upward, horizontal, grapevine, consensus)
- Principles of communication
- Barriers of communication

**MODULE II :**

- Body language (facial expressions, gestures)
- Listening and its advantage
- Written presentation of technical material
- Punctuation & use of capital letters (practical exercises)

**MODULE III :**

- Abstract preparation
- Précis writing
- Agenda of meeting (definition, draft for a given occasion)
- Minutes of meeting (jotting down, minutes book)
- Tools of internal communication – (memo, circular, notes, orders)
- Basic structure of letter (an introduction to different formats)

**MODULE IV :**

- Requisition letters
- Quotations
- Acknowledgements

- Applications
- Project proposal
- (Basics for different type of letters to be given with practice)

#### **MODULE V :**

- Interview skills
- Project Reports
- Resume writing
- Report writing
- Feature write-ups

(Basics for different type of letters to be given with practice)

Note:- The above tasks would be carried out through certain exercises, to name a few- movie screening, dissertation on a selected novel, presentations and public speaking.

Also, the following practices would be observed:

1. A set of exercises in both oral and written communication.
2. Self- managed reading/ writing.
3. Audio and video presentations.
4. Use of print media for explanation of certain topics.

#### **REFERENCE BOOKS**

1. Business Communication – K.K.Sinha.
2. Effective Business communication – Herta.A.Murphy,HERBER.W.
3. Effective Business Communication – AshaKaul.
4. Business Correspondence and report writing – R.C. Sharma and Krishna Menon.
5. Communication Skills – Rajendra Pal, J.S.Korlahalli.
6. Letters for all occasions – S.K.Puri.
7. Business Communication – UrmilaRai, S.M. Rai.
8. Business Communication – M.S.Ramesh, C.C.Pattanshetti.
9. Essential Communication Skills – Shirley Taylor.
10. Essentials of Business Communication – Rajendra Pal and J.S.Korlahalli.

#### **Recommended talks -**

The following Debate and Talk shows are also recommended to improve communication skills

- The Cross Fire
- The Big Question
- Hard Talk on BBC World

The following **movies** are recommended to understand the cross- cultural communication

- East is East
- Hyderabad Blues
- Bend it like Beckham



## Desktop Publishing

### Course Objective

Objective of the course is to provide basic software handling which is useful in day to day work requirement other than office work.

### Course Objective

- Student get ability to understand the uses of desktop publishing
- Student get ability to operate coral draw
- Student get ability to work on Photoshop
- Manipulate text and graphics to create a balanced and focused layout.
- Create fliers, brochures, and multiple page documents.

### Module-1

Introduction to DTP, Introductions to Printing, Types of Printing, Offset Printing, Working of offset Printing, Transparent Printout, Negative & Positives for Plate were making, Use of Desk Top Publishing in Publications, Importance of D.T.P in Publication, Advantage of D.T.P in Publication, Mixing of graphics & Image in a single page production, Laser printers - Use, Types, Advantage of laser printer in publication.

### Module-2

Introduction to adobe PageMaker/In-Design, PageMaker tool box, PageMaker palettes Menus, Icons and dialog box, the control palette, page layout, creating and saving documents, typography, Modifying character attributes, importing graphics, Editing and cropping images, Using the picture palette, The color palette.

### Module-3

Introduction to Coral Draw graphics, Features of Corel Draw, Corel Draw Interface, Tool Box, Effects, Drawing and Coloring, Creating Basic Shapes, Working with Bitmaps, Applying effects on Bitmaps, Introduction o Text Tool, Artistic and paragraph text, Wrapping Text around Object.

### Module-4

Introduction to Basics of Quark express, navigating a QuarkXPress Document, Setting Up the Document, multi-page documents, formatting text, Manipulating Graphics.

### Module-5

Introduction to Photoshop, Understanding Tools & Workspace, Image/Photo Editing -Mixing-Enhancements, Converting Color to b/w and b/w to Color, Shortcuts to work Efficiently, Creating Web Graphics.

### TEXT & REFERENCE BOOKS:

Adobe PAGE MAKER .

PRAKHAR COMPLETE COURSE FOR DTP (CORELDRAW, PAGEMAKER, Quark express PHOTOSHOP)

### Practical LAB:

Complete Page Maker S/W

Complete Adobe Photoshop

## BCA301

### Data Structure using C++

#### Course Objective

Objective is to provide knowledge about various data structure and its implementation using language C++.

#### Course Outcome

- Student will be able to understand different structure to store data
- Notion of abstract data type & recursive access on them
- Analyze data structure impact on algorithms, program design and program performance
- Explain, implement and use link list, stack and queue

**MODULE I:** Introduction to Algorithm Design and Data Structure, Top down and Bottom-up approaches to algorithm design, Recursive and iterative algorithms, Divide and conquer method, Greedy method, branch. Introduction of array (single & multi-dimensional arrays), Implementation of 1-D arrays, Row and Column Major Implementations of 2-D, 3-D and n-D, arrays Applications of arrays.

**MODULE II:** Definition of Data Structure, Types & characteristics of Data structures, Abstract Data Type (ADT), Stack as an ADT, operations on stack, Stack implementation using array, Application of Stack: Recursion, conversions from Infix to postfix & prefix and evolution of prefix expressions using stack. Queue as ADT, Operations on Queue and Types of queues, Queue implementation Using Array.

**MODULE III:** Linked list, Concept of a Linked List, Singly linked list (Operations on list), Linear Single and Double lists, stacks and queues implementation using Linked list, polynomial representation and manipulation using linked list, Application: Reading and writing polynomials, polynomial addition, Circular linked list and doubly linked list, traversal – searches, insertion and deletions, Generalized list, sparse matrix representation using generalized list structure

**MODULE IV:** Trees, Definitions of n-ary, binary trees, Complete Binary Tree, Weight of a tree, Level of a node, Height/Depth of a Tree. Operations on tree, Tree Search Algorithms, Binary Search Tree, Tree traversal Algorithms, Logical level of binary search tree, BST transversal methods (Preorder, Postorder and Inorder), Recursive and non-recursive algorithms for traverse method, Insertion into and deletion from a BST and their implementation, preorder and Postorder, traversal, Insertion in Threaded tree,

**MODULE V:** Searching and Sorting, Sequential and binary searches, Indexed search, Hashing schemes, Sorting methods: Bubble Sort, Sequential Sort, Shell Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort. Definitions of vertex edge and Graph, Types of graphs directed / undirected, connected / disconnected, cyclic / acyclic, Representation of graphs: Adjacency matrix, linked list

#### Text Book:

- Data Structures via C++: Objects by Evolution, by A Michael Berman.

#### Reference Books:

1. Data Structures and Algorithms in C++ by Michael T Goodrich, Roberto Tamassia.
2. Algorithms and Data Structures in C++ by Alan J. Parkar.
3. Applied Data Structures with C++ by Peter Smith.
4. Object Oriented C++ Data Structures for Real Programmers by Jan L. Harrington.

## BCA302

### Computer Graphics

#### Course objective

Graduates understand the graphic working process inside the computer and how algorithms are helpful in drawing different graphical design.

#### Course outcome

- Graduates will know basic concept of graphics in computer domain
- Graduates will draw line using algorithm
- Graduates will transform 2D object.
- Graduates understand 3D image processing basics.

**MODULE I:** Introduction to computer graphics, the advantages of Interactive Graphics, applications of computer graphics, Vector and Raster graphics fundamentals, Point plotting, Line drawing algorithms, Simple DDA, Symmetric DDA and Bresenham's Line Drawing algorithms for all quadrants, Scan Converting Lines, Scan Converting Circles, Mid-point algorithm.

**MODULE II:** Graphics devices, different graphics Input / Output devices, Hardcopy Technologies, Display Technologies, Raster-Scan Display Systems, The Video Controller, Random-Scan Display Processor, Input Devices for Operator Interaction, different types of printers and Image Scanners, Geometric transformations, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations

**MODULE III:** Clipping and Windowing, Window, View port, window to viewport transformations, clipping techniques, point clipping, line clipping algorithm, polygon clipping algorithm, Cohen Sutherland algorithm, polygon inside outside test, polygon fill and boundary fill algorithm

**MODULE IV:** Selective modifications, Display File segmentation, implementation of display file segmentation, Introduction to 3D coordinate system, 3D Projections, perspective and parallel projections, 3D Transformations, translation, scaling and rotation, rotation about plane, rotation about a pivot point in a 3D plane, composite transformation

**MODULE V:** Curves and surfaces, Bezier curve, Realism in 3D, solid figure representations, intensity variation, surface rendering and hidden surfaces. Introduction to computer animation, 3D software development packages, design of graphics package, features and characteristics of a 3D graphics package

**Text Book:**

- Foley, J.D. & Van Dam, A: Fundamentals of Interactive Computer Graphics.

**Reference Books:**

1. R.A. Plastock and G. Kalley, "Computer Graphics", McGraw Hill, 1986.
2. D. Hearn and M.P. Baker, "Computer Graphics", PHI New Delhi; Second Edition, 1995.
3. Max K Agoston, "Computer graphics and geometric modeling".
4. James D Foley, "Computer graphics: Principles and practices in 'C'".
5. Schaum Series "Computer graphics".

**BCA303**

**Discrete Mathematics**

**Course Objective**

Graduates will be able to understand mathematical used in different courses for implementing algorithm and logic

**Course Outcome**

- Graduates get skill to understand set concept of mathematics.
- Student will perform Boolean algebra for logic building
- Student get ability to draw graphs of given problem

**MODULE I:** Arbitrary Cartesian product of sets, Equivalence relations, partition of sets, injective, surjective, bijective maps, binary operations, countable, uncountable sets.

**MODULE II:** Recall of statements and logical connectives, tautologies and contradictions, logical equivalence, algebra of propositions quantifiers, existential quantifiers and universal quantifiers.

**MODULE III:** Boolean algebra and its properties, algebra of propositions as an example, De Morgan's Laws, partial order relations g.l.b, l.u.b, algebra of electric circuits and its applications, Design of simple automatic control system.

**MODULE IV:** Boolean functions- disjunctive and conjunctive normal forms. Boole's expansion theorem, fundamentals forms, many terminal networks

**MODULE V:** Basic Concepts of Graph Theory, Subgraphs, Trees and their properties, Binary trees, spanning trees, Directed trees, Planar graphs, Euler Circuit, Hamiltonian Graph, Chromatic number

**Text Books:**

1. Discrete Mathematics - Dr.H.K.Pathak
2. A textbook of discrete Mathematics - Swapan Kumar Sarkar
3. Graph Theory with application - C. Vasudev

**Reference Books:**

1. Discrete Mathematics - C.L.Liu T.M.Hill
2. Graph Theory and its applications - Narsingh Dev.

**BCA304**  
**Entrepreneurship**

**Course objective**

Graduates will learn basic entrepreneurial concept and become able to use skill to take leading role.

**Course outcome**

- Graduates get ability to become entrepreneur
- Graduates understand issues faced by Indian entrepreneur and global scenario.
- Graduates know about entrepreneurship development programme.

**MODULE I:** Introduction- Entrepreneur-entrepreneurship-and-enterprise: conceptual issues. Entrepreneurship versus Management . Entrepreneurship versus Intrapreneurship. Qualities of an entrepreneur: Role of entrepreneurship in economic development. Role and functions of entrepreneur in relation to new venture creation, especially in the developing country context. Small business as the seedbed of entrepreneurship – contemporary discourse on small and medium enterprises.

**MODULE II:** Theories of entrepreneurial Emergence: Economic, Sociological and Psychological Perspectives. Entrepreneurial competencies motivations, performance and rewards: The concept, metrics and role in entrepreneurial manifestation and sustenance entrepreneurship as a creative and dynamic process. Innovation and entrepreneurial orientation in a developing economy.

**MODULE III:** Global Entrepreneurship monitor (GEM) Project and total Entrepreneurship Index (TEI). India's rank and the issues facing Indian Entrepreneurship. Prominent business families and communities. Issues involved in family business, especially those pertaining to accessing support for one's business ideas, assuming and asserting one's role in family business, and, leadership succession. The contemporary role models in Indian business: their values. Business philosophy and behavioural orientations.

**MODULE IV:** Entrepreneurial Development Programmes: their role, relevance and achievements; Role of Government in Organizing EDPs; Critical Evaluation; Problems and Constraints.

**MODULE V:** Reach of the various promotional programmes, evaluation of their effectiveness and the ways and mean of accessing the available help. Role of industries/entrepreneur's associations and self-help groups. The idea of business and sources of business ideas. Opportunity sensing via personal observation, vicarious experience, primary surveys and secondary data analysis. Role of business consultants/ mentors, entrepreneurship trainers, and, family-and community networks in identifying business opportunities. Compatibility of the business idea with the personal profile of the entrepreneur. Tools and techniques of Economy- sector- Industry analysis and projections.

**Text/Reference Books:**

- Harell (1995), 'For Entrepreneurs Only', New Jersey Career pub.
- Vikram Sarabhai, (1974), 'Management for development' Vikas pub.
- Rajagopal, Entrepreneurship and Rural Markets
- Ovmerod A, (1992), 'Textile, Project Management', the textile Institute.
- Rerry and Franklin, (2002), 'Principals of Management'. AITBS.
- Acharya B.K and Gonekan P.B. (1985) " Marketing and sale Management', Bombay, Himalaya publication house

**BCA305**

**Computational Accounting Statistical Tool**

**BCA401**

**Programming using VB.net**

**Course Objective**

Graduates get knowledge of .Net framework and GUI based interface development concept.

**Course outcome**

- Analyze a given problem and implement an algorithm to solve the problem.
- Implement the visual basic language constructs in the right way

- Design, develop and test applications written in visual basic

**MODULE I: Introduction to .NET:** - NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The environment: Editor tab, format tab, general tab, docking tab. visual development & event drive Programming - Methods and events.

**MODULE II: The VB.NET Language:** Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions, Passing variable Number of Argument Optional Argument, Returning value from function. Control flow statements, conditional statement, loop statement. MsgBox & Inputbox.

**MODULE III: Object oriented Programming:** Classes & objects, fields Properties, Methods & Events, constructor, inheritance. Access Specifiers, Public Private, Protected. Overloading, Friend, Overloading Vs Overriding, Interfaces, Polymorphism, My Base & My class keywords. Overview of OLE, Accessing the WIN32 API from VB.NET & Interfacing with office 97, COM technology, advantages of COM+, COM & .NET, Create User control, register User Control, access com components in .net application.

**MODULE IV: Working with Forms:** Loading, showing and hiding forms, controlling one form within another. GUI Programming with Windows Form: Textbox, Label, Button, Listbox, Combobox, Checkbox, PictureBox, RadioButton, Panel, scroll bar, Timer, ListView, TreeView, toolbar, StatusBar. Their Properties, Methods and events. OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog. Link Label. Designing menus, ContextMenu, access & shortcut keys, System.io Namespace, Reading and Writing data from and into files, File class and related Methods, Stream Reader, Stream Writer , Binary Reader, Binary Writer class, File and Directory Classes,

**MODULE V: Databases in VB.NET:** Databases, Connections, Data adapters, and datasets, Data Reader, Connection to database with server explorer, Multiple Table Connection, Creating Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on Data grid. Data binding with controls like Text Boxes, List Boxes, Data grid etc. Navigating data source, Data Grid View, Data form wizard, Data validation, Connection Objects, Command Objects, Data Adapters, Dataset Class, Overview of ADO, from ADO to ADO.NET, Generate Reports Using Crystal Report Viewer. Crystal Report : Connection to Database, Table, Queries Building, Report, Modifying Report, Formatting Fields and Object, Header, Footer, Details, Group Header, Group footer, Working with formula fields, Parameter fields, Group, Special fields, Working with Multiple Tables, SQL in Crystal Report, Report Templates

#### **TEXT & REFERENCE BOOKS:**

1. VB.NET Programming Black Book by Steven Holzner - Dreamtech Publications.
2. Mastering VB.NET by Evangelos Petroustos - BPB Publications.
3. Introduction to .NET framework - Wrox Publication.

## **BCA402**

### **Principal of operating system & Linux concept**

#### **Course objective**

Graduates be able to understand basic concept related to operating system. Graduates will able to run Unix Operating system command and get familiarity with windows.

#### **Course outcome**

- Analyze the concept of processes in operating system and booting process.
- Graduates get ability run basic commands of Unix
- Graduates get familiarity with windows and other well known operating system
- Graduates understand real time operating system

#### **Module-I**

Introduction to Operating Systems, Types of operating systems, Major components of OS, BIOS, IVT, BIOS versions, Dual booting, Various Operating system architectures, Design Principles, Operating Systems for tiny devices (like mobile, tablets, set-top boxes).

### **Module-II**

Introduction to Unix, versions of Unix, Kernel architecture, Unix Shell and its types, File system, Structure of the inode, etc. Memory Management in Unix. Process States, Process State Transition, Process Control Block (PCB), Parent-child relationship, The different segments of a process, Internal and external commands, Process creation basics (fork() and wait()), Role of init in process creation and in spawning user shells, Exporting variables (export) and consequences, Exit status of a process (%?), Displaying process attributes (ps), Killing processes (kill), Running commands in background (& and nohup), Job control (fg, bg and [ctrl-z]), Scheduling processes (cron), Interprocess communication in UNIX.

### **Module-III**

Introduction to Linux, versions of Linux, Kernel architecture, File system- ext2, ext3, ResierFS, Journaling capability, Linux Booting process, Boot strap loader- LILO, Grub. Memory Management in Linux. Linux Shell and its types, concept of X-Window, KDE, Gnome. Understanding shells, Processes in linux, process fundamentals, connecting processes with pipes, Redirecting input output. Background processing, managing multiple processes, changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep.

### **Module-IV**

Microsoft Windows families, Windows NT family, Windows File Systems, Booting Sequence, Windows 8 as Case Study: Architecture, aero and metro interfaces. Introduction to Apple's Mac OS X, basics, The Mac OS X File Structure, File Organization, memory, Units of Measure, storage, and organization methods. Utilities: Essential Tools for Managing and Maintaining Mac.

### **Module-V**

RealTime Operating System: Principles, Semaphores and Queues, Hard RealTime Scheduling Considerations, Saving Memory and Power, An example RTOS like uCOS (Open Source).

### **Text Books and References:**

- "Operating Systems Design & implementation", Andrew S. Tanenbam, Albert S. Woodhull Pearson.
- Operating System Concepts (7<sup>th</sup> Ed) by Silberschatz and Galvin, Wiley, 2000.
- Sumitabha Das, Unix : Concepts and Applications, Third Edition, 1998, Tata McGraw Hill.
- Refer Research Papers and Google Scholar.

## BCA403

### Data Communication and Network

#### Course Objective

Objective is to provide concept of data communication and familiarized with the basic protocol of computer networks.

#### Course Outcome

- Identify the different component in a communication system and their respective tools
- Describe the technical issues related to the local area networks
- Identify the common technologies available in establishing LAN infrastructure

**MODULE I:** Introduction to Computer Networking and OSI Layer; Concept of Networking, Data Communication, Required network elements, the role of Standards Organization. Various Topologies, Transmission Mode, Categories of Networks- LAN, MAN, WAN. The benefits of a Computer Networks, The Concept of Layered Architecture, Functions of the Layers. Comparison between OSI and TCP/IP Reference model

**MODULE II:** Transmission of Digital Data; Shannon's and Nyquist theorems for maximum data rate of a channel. Transmission media- Co-axial, UTP, Fiber Optic and wireless. DTE-DCE interface using RS-232C

**MODULE III:** Multiplexing and Switching; The Static and Dynamic channel allocation, The Concept of Multiplexing- FDM, TDM, WDM. The Concept of Switching- Circuiting, Message switching, Packet switching

**MODULE IV:** Data Link Layer and Routing Algorithms ;Line Discipline, Flow Control- stop and wait, sliding window, Go back N, Error Control- ARQ stop and wait, sliding window ARQ. HDLC, SLIP, PPP. Multiple access protocols- CSMA/CD. IEEE standards for LAN's and MAN's. The IP protocol, IP address classes and subnet mask, the concept of ICMP, ARP, RARP

**MODULE V:** Transport and Application Layer; The Concept of client and Server in Transport layer, The Concept of Domain Name System, Various Resource Records, Architecture and services of E-mail (RFC-822 and MIME), The Concept of World Wide Web- server side and client side

#### Text Books:

1. Computer Networks – Third and Fourth Edition By Andrew Tanenbaum (PHI Pub.)
2. Data & Computer Communication – Sixth Edition by William Stallings (PHI Pub.)

#### Reference Books:

1. Computer Networks– A S Tanenbaum.
2. Data Communication and Networking- Forouzan.

**BCA404**  
**MINI PROJECT**

**BCA405**  
**Client Server Architecture Implementation and Troubleshooting**



# BCA501

## Programming in Core JAVA

### Course Objective

To impart the basic concepts of Java Programming and to develop understanding about Basic object Oriented design using UML and Applet

### Course outcome

- Understands fundamental constructs of OOP.
- Gets the knowledge of different forms of OO Implementation.
- Apply object oriented programming concepts in problem solving through JAVA.
- Design and implement Applet and event handling mechanisms in programs

**MODULE I:** Introduction History of Java , Application of Java, Java Virtual Machine ,Byte code, Procedure-Oriented vs. Object-Oriented Programming , Object Oriented Programming Concepts Abstraction ,Encapsulation, Polymorphism and Overloading , Setting Up Your Computer; Writing, Compiling, Interpreting and Running the program, Common errors , Holding Data, Primitive Data Types, Integers, Floating-Pint types, Characters, Booleans, User-Defined Data Types, Declaration, Constants, Identifiers, Literal, Type Conversion and Casting, Objects and Wrapper Classes, Variables, Variable Definition and Assignment, Default Variable Initializations, Command Line Arguments, Array of Primitive Data Types, Comment Syntax, Garbage Collection, Controlling the flow, Expression, Operators & its types, control statements & its types.

**MODULE II:** Fundamental of Classes :A simple class, Creating Class instances, Adding Methods to a class, Calling Function/Methods, Using ‘this’ Keyword, Constructors & its types, More on Methods: Passing by value, by Reference, Access control, Methods that Return Values, Method Overloading, Recursion : Nested and Inner classes: Inheritance & Packaging : Inheritance : Using extends keyword, Subclasses and Super classes super keyword usage, overriding Methods, Dynamic Method Dispatch, The object class, abstract and final classes, Packages : Defining a package, importing a package, Access control, Interfaces: Defining an interface, implementing and applying interface.

**MODULE III:** Exceptions: Introduction, Exceptions syntax, Exception Categories, Using Exceptions, JAVA Applications, Build a simple command-line application, Java applet, Applet Life cycle , <Applet> tags ,Applet methods ,Basic applet configuration ,Build a simple applet Threads and Multithreading, The Lifecycle of a thread, Creating and running threads, Creating the Service Threads, Schedules Tasks using JVM, Thread-safe variables, Synchronizing threads, Communication between threads.Java Bean: Introduction, Creating and Using bean, JDK tools.

**MODULE IV:** Intro to GUI Applications, Intro to AWT , Containers, Components, Layout Manager, Frame and Panel Containers, User Interface Events, Adapter Classes, Introduction to JFC and Swing, Features of the Java Foundation Classes, Swing API Components, JComponent Class, Windows, Dialog Boxes, and Panels, Labels, Buttons, Check Boxes, Menus, Toolbars, Implementing Action interface, Pane, JScrollPane, Desktop pane, Scrollbars, Lists and Combo Boxes, Text-Entry Components, Colors and File Choosers, Tables and Trees.

**MODULE V:** Overview of Networking, Working with URL, Connecting to a Server, Implementing Servers, Serving multiple Clients, Socket Programming, Internet Addresses, URL Connections, Accessing Network interface parameters, Stream: Introduction, types , Java.io package, Node streams, Processing streams, Readers, Writers, Creating Streams, Serialization Interface, Accessing database data using Java ,Driver types ,Statement, Prepared Statement and Callable Statement, Retrieving and using the ResultSet ,Using ResultSetMetaData, DatabaseMetaData

### Text Books:

1. Complete reference java 2 – Herbirt Schildt Pub. TMH.
2. SAMS teach yourself Java – 3rd edition Roger Cedenhead, Pearson Publication.

### References Books:

1. Programming in java – E. Blaguswami
2. Beginning Java programming – Wrox Series
3. JAVA Certification - Khalid Mughal.

# BCA502

## Web Designing

### Course objective

Graduates get exposure for web pages, CSS, Java script and protocols.

### Course Outcome

- Graduates get ability to make web pages
- Graduates get ability to develop web pages using Java script
- Graduates get skill in XML

**MODULE I:** Exploring the World Wide Web, World Wide Web Consortium, Architecture of WWW, Web protocols, HTTP, HTML, URL, Web Standards, HTML – Versions, Editor, Elements in HTML Documents, HTML Elements, and HTML Tags – Container Tag, Empty Tag, Tag Attributes, Viewing the source of a web page. HTML Document Structure – Head Section, Markup elements with head: Base element, Is Index element, Link element, Meta element, Title element, Script element; Body Section – Body elements: Background, Text Body, Address element, Block quote element, Comments in HTML.

**MODULE II:** DOCTYPE declaration, META tags , Tables - Learn the basic structure of a table ,Learn how to create table rows and columns for layout, Tables for layout- Cell padding and cell spacing, Cell alignment, Background images in tables ; Links, Lists and Images, create links to other pages/sites, add images to web page ,Forms and Validation ,Understand the structure of forms ,Input Types – Text, Password, Checkbox, Radio, Submit and Reset, Text area, Drop Down Menu or Select Menu Tag, Image Buttons. Frames –Overview, Use of no-frames, Frame Targeting.

**MODULE III:** CSS in a Nutshell, the Benefits of CSS ,How CSS Works ,Rule Syntax ,Adding Styles to a Document ,Key Concepts ,Specifying Values, Browser Support , Type (Element) Selector - Contextual Selectors, Class and ID Selectors, Attribute Selectors, Font Family ,Font Size ,Other Font Settings ,Text Transformation (Capitalization) Text Decoration, Line Height, Text Alignment Properties, Text Spacing, Text Direction, Margins, Borders, Padding, Foreground Color, Background Color, Background Images, The Essence of Tables, Styling Tables, Borders, Table Layout (Width and Height), Table Display Values, Styling Background, Styling Lists, CSS Box Model.

**MODULE IV:** JavaScript, JavaScript Syntax, Java Script Statements, Java Script Comments, Java Script Variables, Java Script operators, Java Script comparisons, Conditional Statements: If else, Switch, Pop up Boxes, Compound Statements: loops, 'while', and 'for' Functions, Nesting Conditionals: 'else if' and 'switch', Logical Operators: Boolean values ,Data Arrays, Debugging ,Program Development in General ,Multi-dimensional Arrays.

**MODULE V:** XML Basics, How It Works, XML Document Syntax, Well-Formed XML, XML Namespaces, XML on the Web ,Web-Related XML Applications , The Role of HTML , Markup Basics , Introduction to XHTML , XML Tree, XML Syntax, XML Elements, XML Attributes, XML Validation, XML Validator, XML Viewing.

### Reference Books:

1. Web Redesign: Workflow that Works
2. HTML & XHTML: The Complete Reference Guide, 5th Edition
3. The Non-Designer's Web Book, 3rd Edition
4. JavaScript Concepts and Techniques
5. 'The Unfair Advantage Book on Winning the Search Engine Wars', An e-Book from Planet Ocean Communications
6. Web Design in a Nutshell, Second Edition by Jennifer Niederst Robbins, Second Edition September 2001
7. Learning Web Design: HTML, Graphics, and Animation
8. A Beginner's Guide to HTML, Graphics, and Beyond by Jennifer Niederst Robbins

**BCA503**  
**Elective I**  
**OPTIMIZATION TECHNIQUES**

**Course Objective**

Objectives of the course is to introduce the fundamental concepts of optimization Techniques, make the learners aware of the importance of optimizations in real scenarios.

**Course Outcome**

- formulate optimization problems
- understand and apply the concept of optimality criteria for various type of optimization problems
- solve various constrained and unconstrained problems in single variable as well as multivariable
- apply the methods of optimization in real life situation

**MODULE I:** Introduction to O.R. Scope of operations research, Operational research modeling- definition and scope of operational Research, Linear programming: formulation, Identification for decision variable, construction of objective function and constraint, assumption, convex sets, Feasible, Basic feasible, and optimal solutions, Extreme point and graphical method

**MODULE II:** Linear Programming Problem: Introduction, formulation of LP problems, Graphical solution, Simplex method: Artificial variable techniques Big-M- method (Charné's penalty method), Concept of Duality: Definition of primal and dual

**MODULE III:** Transportation model: Introduction, mathematical formulation Existence of Feasible solution, Basic feasible solution, and optimum solution, Methods for initial feasible solution: North- west corner rule, Row minima method, Column minima method, Low cost entry method, Vogel's approximation method moving toward optimum solution, Assignment Models: Mathematical formulation of assignment problem, Hungarian Method for assignment problem

**MODULE IV:** The terminology of networks: Graphs, Nodes, Branches etc. Network diagram representation, Rules for drawing Network diagram, Time estimates and critical path in network analysis, Examples on optimum duration and Minimum duration, Project evaluation and review Technique,

**MODULE V:** Short review of probability theory, Basic structure of queuing models, Input source, queue, Service discipline, Service Mechanism, Terminology and notation, Steady state solution of Markovian queuing models. M/M/1, M/M/1 with limited waiting space, M/M/C, M/M/C with limited waiting space

**Text Books:**

1. Operations Research : KantiSwarup, P.K Gupta
2. Operations Research : V.K. Kapoor
3. Quantitative techniques in management : N.D. Vohra
4. Operations Research: An Introduction, 7th Edn. H. Taha, PrenticeHall, 2002
5. Linear Programming and Extensions, G Dantzig, Princeton University Press, 1963

**Elective I**  
**GRAPH THEORY**

**Course Objective**

Students will come across a number of theorems and proofs. Theorems will be stated and proved formally using various techniques. Various graphs algorithms will also be taught along with its analysis.

**Course Outcome**

After the course the student will have a strong background of graph theory which has diverse applications in the areas of computer science

**MODULE I**

Definition of a graph-finite and infinite graphs - incidence and degree - sum of degrees equals twice the no. of edges (Proof included) - Degree sequence - isolated vertex - pendant vertex – null graph - regular graph-isomorphic graph – sub graphs –walks – paths – circuits - connected graphs - disconnected graphs - components of a graph - operations on graphs – Euler path & Euler graphs – Hamiltonian Paths & Graphs – Weighted graphs (No Theorems)

**MODULE II** Definition of Trees – Properties of Trees - Pendant Vertices in a Tree - Distance and centers in a Tree - Rooted and Binary Trees - Spanning Trees. (No theorems), Trees with directed edges - Arborescence

– fundamental circuits in digraphs- Matrices A,B & C of digraphs - Adjacency Matrix of digraphs (No Theorems)

**MODULE II** Cut sets and Cut vertices – Fundamental circuits and cut sets – Edge Connectivity - Vertex connectivity – Separable Graphs – Planar Graphs - Kuratowski's graphs – Different representations of Planar graphs (No Theorems).Incidence Matrix A – Circuit Matrix B – Fundamental Circuit Matrix – Cut Set Matrix C - Relationship between A,B and C - Path Matrix – Adjacency Matrix.

**MODULE III** Coloring of a Graph , Chromatic number - Chromatic Partitioning – Chromatic Polynomial – Coverings - Four Color Problem ( No theorems)Definition of Directed Graphs & Related definitions - Directed path and connectedness -Euler digraphs

**MODULE V** Graph Theory - an Algorithmic approach – Detecting a Spanning Tree - Detecting cut vertices and separability – Detecting a shortest path from a specified vertex to another specified vertex – Detecting a shortest path between all pairs of vertices – Planarity testing.

TEXT BOOK :

- Narasingh Deo : “ Graph Theory with Applications to Engineering and Computer Science” , PHI-India
- F Harary : “Graph Theory” , Narosa Publishing House

**BCA504**  
**Elective II**  
**Research Methodology**

**Course Objective**

Become knowledgeable of the research process and its different approaches. Develop critical thinking to find business opportunities and to solve questions related to service industries

**Course Outcome**

- Apply a range of quantitative and / or qualitative research techniques to business and management problems / issues
- Understand and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making
- Demonstrate knowledge and understanding of data analysis and interpretation in relation to the research process

**MODULE I** Meaning, Objectives and Motivation in Research, types of Research, Research Approaches, Research Process, Validity and Reliability in Research, Obstacles in accepting research. Problem Formulation, Hypothesis Formulation, types of Hypothesis, characteristics of Good Hypothesis Meaning and Significance of Research Designs, Features of a good research design, types of research design, contents of research design

**MODULE II** Census Vs. Sample. Steps in Sample Design. Determining the size of Sample. Sampling methods - Simple Random Sampling, Stratified Sampling, Systematic Sampling, Cluster Sampling, Selective Sampling. Types of Data, Sources of Data – Primary and Secondary Data. Methods of collecting the data. Testing the validity of the data.

**MODULE III** Measurement and scaling techniques, errors in measurement, tests of sound measurement, scaling and scale construction techniques

**MODULE IV** Steps in Questionnaire design, characteristics of a good questionnaire Presentation, Processing & Analysis and Interpretation of Data. Report Writing – layout of a Research Report, Characteristics of a good research report

**MODULE V** Measures of Central Tendencies and Dispersions – Simple Numerical Calculations for understanding the characteristic values Linear Correlation and Linear Regression – 2 Variables

**References:**

- 1) Research Methodology Methods & Techniques - C. R. Kothari, New Age International
- 2) Statistical Methods - S. P. Gupta, Sultan Chand, New Delhi
- 3) Business Research Methods - William G. Zikmund, Thomson South-Western
- 4) Introduction to Quantitative Research Methods - Mark Balnaves and Peter Caputi, Sage Publications

**Elective II**  
**MIS**

**Course Objective**

students are able to understand the usage of Information Systems in management. The students also would understand the activities that are undertaken in acquiring an Information System in an organization.

**Course Outcome**

- Record the current issues of information technology and relate those issues to the firm
- Reproduce a working knowledge of concepts and terminology related to information technology
- Analyze how information technology impacts a firm
- Interpret how to use information technology to solve business problem.

**MODULE I:** MIS Concepts, definition, scope of MIS, Importance of MIS, Structure of MIS, classification of MIS, information, types of information, information quality, dimensions of information system definition, kinds of systems, system related concepts, elements of system

**MODULE II:** Computer system, hardware classification, computer software, programming languages, database management system, database structure, data models, sql, telecommunication, types of signals, communication channel characteristics of channel, network, types of network

**MODULE III:** E-commerce, Types of ecommerce, Electronic commerce and trade cycle, Business strategy, strategic implementation of IT, strategy formulation and implementation planning, e-commerce implementation, e-commerce evaluation ,decision making concept, types of decisions, decision making and MIS, decision support system, characteristics and capabilities of DSS

**MODULE IV:** Concept of the business process re-engineering (BPR), System development Cycle, System Planning and the Initial Investigation, information gathering tools requirement determination, strategies for requirement determination, structured analysis tools

**MODULE V:**Implementation process, hardware and software selection , system maintenance, evaluation of MIS, information system planning, planning terminology, models of information system planning, selecting a methodology, Information Resource management

**Reference/ Text Books:**

- Management Information System – D. P. Goyal
- Management Information Systems: Solving Business Problems with Information Technology,
- 3/e Gerald V. Post, University of the Pacific, David L. Anderson, DePaul U/McGowan Center.

**BCA505**  
**Industrial/Company/Professional Training**

**BCA601**  
**Advanced JAVA Programming**

**Course Objective**

Objective of this course is to provide the ability to design console based, GUI based and web based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications

**Course Outcome**

- Graduates get ability to implement java database connectivity and ODBC bridge connectivity
- Graduates get ability to understand and implement RMI
- Graduates get ability to handle CGI and servlet
- Graduates get basic understanding of EJB

**MODULE I:** Java Database Connectivity: JDBC architecture; Drivers, JDBC-ODBC bridge, native API partly java driver, Net Protocol all Java driver, Native protocol all Java driver; Connecting to Database; statements; Multiple result sets, Java Database Connectivity: JDBC architecture; Drivers, JDBC-ODBC bridge, native API partly java driver, Net Protocol all Java driver, Native protocol all Java driver; Connecting to Database; statements; Multiple result sets.

**MODULE II:** Remote Method Invocation, RMI Architecture Working with distributed objects ,3 phase deployment Creating the interfaces ,Using the RMI compiler ,RMI Register, Creating Stubs and Skeletons, Running the RMI registry ,Creating and Binding Objects , Java Naming and Directory Interface, JNDI Overview ,JNDI API , Calling the objects from the client ,Java and CORBA, What is CORBA? , Using Java IDL, Creating and running a CORBA application, Using IIOP for distributed applications, Creating and Running RMI/IIOP applications.

**MODULE III:** Overview of the J2EE Technologies, Components & Containers , J2EE framework and functionalities 2/3/N-tier Architecture ,Benefits of working server side using Java ,Web Architecture and Fundamentals, Servlet Vs CGI ,WAR file, Servlets API , Life cycle Phase and methods, Get and Post , Session Tracking, Session Interface, Servlet Config, Servlet Context, Forward/include/ send redirect, servlet chaining, deployment descriptor.

**MODULE IV:** Introduction to JSP ,Basic JSP Syntax ,Java Server Pages, JSP Vs Servlet, MVC Architecture ,JSP Scripting Tags, JSP Attributes, JSP implicit Objects, JSP Action.

**MODULE V:** Introduction to EJB, EJB Overview and architecture, EJB container, Types of EJB, life cycle of EJB, CMP VS BMP life cycle phase and Methods, State less Vs. Statefull bean and life cycle, Enterprise Archive, EJB Deployment.

**Text Books:**

- Servlet and JSP Programming, O'Reilly.
- Core Servlets & JavaServer Pages, 2nd Edition, SUN.
- Enterprise JavaBeans 3.0, by Richard Monson-Haefel, Bill Burke.

**Reference Books:**

- Building Java Enterprise Applications.
- Java Servlet Programming, Second Edition.

**BCA602**  
**Introduction to .Net Framework and C#**

**Course Objective**

This course is designed to provide the knowledge of Dot Net Frameworks along with C#

**Course Outcome**

After completion of the course the student will be able to use the features of Dot Net Framework along with the features of C#

**MODULE I:** Introduction to .Net, what is .Net environment, .Net framework, features of .Net platform, future of .Net, introduction to Common Language Runtime(CLR), Microsoft Intermediate Language, Class libraries, .Net Framework Base Classes, Common Language Specifications (CLS), Console applications, introduction to Windows Form, Web Forms, introduction to Web services, languages supported by .Net,

installation of .Net framework and C# compiler, Installing Visual Studio .Net, introduction to Microsoft IDE, introduction to VB.Net, ADO.Net, XML.Net

**MODULE II:** Introduction to C#, syntax and structure of C#, differences between C++ and C#, creating the source code, compiling, intermediate language code and execution, C# keywords, literals and identifiers, C# expressions, operators and statements, namespaces and 'using' keyword, C# data types, constants, creating references, variable declaration, Class declaration, understanding System namespace, operators precedence and hierarchy, conditional statements, If, If-Else construct, nested If-Else, switch statement, loop constructs, while, for, for each statements, break, continue statements, data type conversion, creating console applications.

**MODULE III:** C# and OOPS, features of OOPS, Classes and Objects, public static void main method, methods and data members, nested classes, use of Static variable, creating properties, property accessor methods, constructors and destructors, Finalizers, structure, enumerators and arrays, multidimensional array, checking array lengths and bounds, overloading methods, overloading constructors, using variable number of parameters, learning scope, namespaces and nested namespaces, naming a namespace, exceptions and exception handling, try, catch, finally statements, defining and throwing own exceptions, working with Inheritance, Abstract classes, exploring polymorphism, operator overloading and virtual methods.

**MODULE IV:** Understanding console Input and Output, formatting numbers, date and time and strings, Working with String Class, using String class methods for reading and writing, building Strings, Introduction to Interfaces, Classes versus Interfaces, using and defining interfaces, using multiple interfaces, using Explicit interface members, working with Events, Delegates and Indexers, creating events and event handlers, multiple event handler, Classes in the .Net Framework, checking out the framework classes, working with timer, getting directory and system environment information, working with Math routines, working with Files, copying a File, getting information about a File, understanding streams, creating and opening files, working with simple data files, understanding the order for reading files.

**MODULE V:** Introduction to Collection classes, using generic collections, generic methods and generic interfaces, working with List, String etc, introduction to nongeneric classes, using nongeneric classes, working with Array List, Linked List, Queue, Stack etc, advantages of generic over nongeneric, template classes, creating our own generic classes, creating our own generic methods, creating our own generic interface, introduction to iterators, Introduction to Visual C#, Working with Visual C#, creating console applications with Visual C#, Windows form: creating window application, controls, events, XML documentation, Basic introduction to Web forms ADO .NET: Relational Database, Data set Object, Data Adapter, Command and connection, Data View, Working with managed provider, using the Generic provider, Data binding, Modeling table relationship, updating data, Transaction, Dataset updates, Concurrency.

#### **Reference Books:**

1. BL Jones (2002). SAMS Teach Yourself C# in 21 Days, SAMS.
2. J Shap & J Jagger (2003). Microsoft Visual C# .NET 2003, Microsoft Press.
3. Tom Archer and Andrew Whitechapel, Inside C#, 2nd Ed., Microsoft Press.
4. Harvey M. Deitel, C# For Experienced Programmers, Prentice Hall.



## BCA603

### Elective III Data Mining Techniques

#### Course Objective

Objective is to introduce the basic concepts of Data Warehouse and Data Mining techniques and discover interesting patterns, analyse supervised and unsupervised models and estimate the accuracy of the algorithms.

#### Course Outcome

- Process raw data to make it suitable for various data mining algorithms.
- Discover and measure interesting patterns from different kinds of databases.
- Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.

**MODULE I:** Introduction - What is Data mining , Data mining - important Data mining - various kind of data - Data mining Functionalities – Various kinds of Patterns Pattern Interesting Classification of Data mining Systems Data mining Task Primitives Integration of Data Mining System Major issues in Data Mining

**MODULE II:** Data Processing - Process the Data Descriptive Data Summarization – Measuring Central Tendency Dispersion of Data Graphic Displays of –Basic Descriptive Data Summaries Data Cleaning Data Integration and Transformation data Reduction

**MODULE III:** Data Warehouse OLAP Technology An overview - Data Warehouse Multidimensional Data Model Data Warehouse Architecture Data Warehouse Implementation

**MODULE IV:** Mining – Frequent Patterns Associations Correlations - Basic Concepts Road Map Efficient Scalable Frequent Itemset Mining methods Mining – Various Kinds of Association rules Applications Trends - Data mining Applications Data mining – System Products Research Prototype Additional Themes on Data Mining Social impact of Data mining Trends in Data mining

**MODULE IV:** Database/OLTP Systems, Fuzzy sets and Fuzzy logic, Information retrieval, DSS, Dimensional modeling, OLAP, Web search engines, Machine learning, Pattern Recognition, Basic Data mining task, Data mining issues and metrics, Data mining versus KDD, Basic classification, clustering and Association rule case study

#### Text Book :

1. Data Mining ( Concepts and Techniques ) Second Ed Author : Jiawei Han and Micheline Kamber Publishers : Morgan Kaufmann Publishers ( An imprint of Elsevier )
2. Data Mining (Practical Machine Learning Tools and Techniques (II Edition) Author : Ian H. Witten & Eibe Frank Publishers : Morgan Kaufmann Publishers (An imprint of Elsevier]
3. Data Warehousing , Data mining & OLAP ( Edition 2004 ) Author : Alex Benson, Stephen V. Smith Publishers : Tata McGraw – Hill
4. Data Mining ( Next Generation Challenges and Future Directions ) Author : Karguta, Joshi, Sivakumar & Yesha Publishers : Printice Hall of India ( 2007 )

### Elective III Electronics on Communication

#### Course Objective

Objective of this course is to provide information about major components of communication and devices used in computing world.

#### Course Outcome

Graduates get revision and additional knowledge about gates, addressing mode, micro operation and Input/output organization.

**MODULE I:** Overview of Computer Hardware, basic structure of computer, concept of Von Neumann, various functional blocks, data representation and codes, Number System and Codes: Decimal, Binary, Hexadecimal, Octal, BCD, ASCII, UNICODE, EBCDIC, Conversions, Complements (1's and 2's), Signed and Unsigned numbers, Addition and Substraction, Multiplication, Digital Logic Families: RTL, DTL, TTL and ECL, MOS and CMOS, Comparison, Realization of basic gates, Fan In and Fan out, power dissipation and noise Immunity, propagation delay, tri state logic, Logic Gates and Boolean Algebra: Truth Tables, OR, AND, NOT, EXOR, Universal (NOR and NAND) Gates, Boolean algebra and Minimization of Boolean Functions, Karnaugh Map, DeMorgan's Theorems.

**MODULE II:** Addressing modes, types of addressing modes, different types of instructions, Instruction Cycle, Memory-Reference Instructions, Register reference instructions, Input - Output Instructions, Arithmetic and Logic Unit, Introduction to memory Unit, control unit and Instruction Set, Working with an ALU, Concepts of Machine level programming, Assembly level programming and High level programming, Design of Accumulator Logic Shift Unit, Concepts of subroutines and subroutine calls, use of stack for handling subroutine call

**MODULE III:** Central Processing Unit, Introduction and its basic structure, General Register Organization, Functional blocks, Fetch and Execution cycle, Instruction sequencing, Introduction to CPU design, Instruction interpretation and execution, Micro-operation and their RTL specification, Hardwired control CPU design, Micro programmed control CPU design, microinstructions and their encoding, Arithmetic and Logic Unit, circuit diagram for arithmetic operations, BCD adders and subtractors

**MODULE IV:** Memory and storage, Processor Vs memory speed, static and dynamic memory, High-speed memories, access time, read only memories, Memory Hierarchy, Main Memory, Cache memory, Associative memory, Interleaved memory, Virtual memory and Memory management hardware. Concepts of semiconductor memory, CPU-memory interaction, organization of memory MODULES, Cache memory and related mapping and replacement policies, Virtual memory, secondary storage memory, floppy disks, magnetic disks, paging

**MODULE V:** Input/output organization, Addressing I/O devices, data transfer and synchronization, interrupt handling, I/O channels and interfacing, I/O devices, printers, VDU, keyboard, mouse etc. Peripheral devices, Asynchronous, Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), I/O processor. Programmed controlled I/O transfer, Interrupt controlled I/O transfer, DMA controller

**Text Book:**

- Morris Mano- Computer System Architecture, Prentice Hall.

**Reference Books:**

1. William Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall of India Private Limited, 2001.
2. Harry & Jordan, Computer Systems Design & Architecture, Addison Wesley, Delhi, 2000.
3. Malvino, "Digital Computer Electronics: An Introduction to microcomputers", McGraw Hill, 1993.
4. Michael J. Flynn, "Computer Architecture"
5. Sajjan G. Shiva, "Computer Design and Architecture"

## BCA 604

### Elective IV Cryptography

#### Course Objective

Enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems.

#### Course outcome

Students will have knowledge and understanding of: Classical and modern encryption techniques, Confidentiality using symmetric encryption, Basics of number theory, Public key cryptosystems, Message authentication, E-Mail, IP and web security, System security, Intruders, Malicious software, Firewalls.

**MODULE I:** Security problems in computer networks – kinds of security breaches – security services – conventional encryption model – classical encryption techniques.

**MODULE II:** Block cipher – design principles – Data Encryption Standard (DES) – triple DES – International Data Encryption Algorithm (IDEA) – RC2, RC5 – Blowfish – CAST 128 – Confidentiality using conventional encryption.

**MODULE III:** Principle of public key cryptosystems – RSA Algorithm – Elliptic curve cryptography – message authentication and Hash function – MD5 message digest Algorithm – Secure Hash Algorithm (SHA-1).

**MODULE IV:** Digital signatures and Authentication protocols – Kerberos – X.509 directory Authentication service – E-mail security – Pretty Good privacy, S/MIME – IP Security – Web security.

**MODULE V:** Intruders – Intrusion techniques – Intrusion detection – viruses and related threats – worms – Firewalls.

#### Text Book:

1. William Stallings, “Cryptography and Network Security: Principles and practice”, Pearson Education Inc., 1999.
2. Baxer, “Networking Security”, McGraw Hill, 1996.
3. Derek Atkins, “Internet Security”, Techmedia, 1998.
4. Simonds, “Network Security”, McGraw Hill, 1998.

### Elective IV Cloud computing

#### Course Objective

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including IaaS, PaaS, SaaS, and developing cloud based software applications on top of cloud platforms.

#### Course Outcome

- Understanding the key dimensions of the challenge of Cloud Computing
- Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization
- Assessing the financial, technological, and organizational capacity of employer’s for actively initiating and installing cloud-based applications.
- Assessment of own organizations’ needs for capacity building and training in cloud computing-related IT areas

**MODULE I:** Cloud Computing Basics: Cloud Computing Overview-Applications-Intranets and the Cloud-First Movers in the Cloud. Your Organization and Cloud Computing: When you can use cloud computing - Benefits-Limitations-Security Concerns. The Business Case for Going to the Cloud: Cloud Computing Services – How those applications help your business.

**MODULE II:** Hardware and Infrastructure: Clients-Security-Network-Services. Accessing the Cloud : Platforms-Web Applications-Web APIs-Web Browsers.

**MODULE III:** Cloud Storage: Overview-Cloud Storage Providers. Standards: Application-Client-Infrastructure-Service

**MODULE IV:** Software as a Service: Overview-Driving Forces-Company Offerings-Industries. Software plus Services: Overview-Mobile Device Integration-Providers-Microsoft Online Developing Applications:

Google-Microsoft-Intuit QuickBase-Cast Iron Cloud-Bungee Connect- Development- Troubleshooting- Application Management.

**MODULE V:** Migrating to the Cloud: Cloud Services for Individuals- Cloud Services Aimed at the Mid Market – Enterprise – Class Cloud Offerings-Migration. Best Practices and the Future of Cloud Computing: Analyze your Service-Best Practices-How Cloud Computing Might Evolve.

**Reference Books:**

Cloud Computing by A Practical Approach by Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw-Hill Education Private Limited, New Delhi,2010 Edition, Fifth Reprint 2011.

<b>MSIT/BCA/604</b>	<b>Subjects</b>	<b>Project Work</b>	<b>Viva</b>	<b>Internal Assessment</b>	<b>Total</b>
<b>Max. marks</b>	System Development project	<b>200</b>	<b>50</b>	<b>100</b>	<b>350</b>
<b>Min. marks</b>	(System Design and Implementation)	<b>100</b>	<b>25</b>	<b>50</b>	<b>175</b>

- Synopsis of a project must be given within 10 days of starting the project.
- Regular reporting of project progress
- Hard binded copy as well as soft copy of project work must be submitted