

Vinoba Bhave University, Hazaribag

UNIVERSITY DEPARTMENT OF COMPUTER APPLICATIONS VINOBA BHAVE UNIVERSITY, HAZARIBAG

COURSE STRUCTURE CHOICE BASED CREDIT SYSTEM

The proposed CBCS system has the potential of providing a choice of a wide spectrum of subjects/branches of subjects to students in pursuit of achieving their cherished goals. This system has been globally accepted and now has become the need of the day. The UGC also has provided guidelines to the Universities for consideration and implementation of CBCS.

The University Department of Computer Applications proposes the following courses and credits to be initiated at BCA w.e.f. the session 2015-18. The proposed system may be modified/improved in future according to the requirements.

CORE Papers for BCA

Semester – I

Paper Code	Title	Credit	Marks
BCA F1001	Communication Skills	4	100
BCA F1002	Basic Mathematics I	5	100
BCA F1003	Business Practices And Management	4	100
BCA C1004	Introduction to Computer Software	5	100
BCA C1005	Problem Solving and Programming in C	5	100
Sessional			
BCA P1006	Computer Basics and PC Software Lab	1	50
BCA P1007	C Programming Lab	1	50

Semester – II

Paper Code	Title	Credit	Marks
BCA F2001	Basic Mathematics II	4	100
BCA F2002	Environmental Science	4	100
BCA C2003	Database Management System	5	100
BCA C2004	Object Oriented Programming using C++	5	100
BCA C2005	Logic Design	5	100
Sessional			
BCA P2006	C ++ Programming Lab	1	50
BCA P2007	Database Management System Lab	1	50

Semester – III

Paper Code	Title	Credit	Marks
BCA C3001	Data Structure using C	5	100
BCA C3002	Java Programming	5	100
BCA C3003	Computer Architecture and Assembly Language	5	100
BCA C3004	System Analysis and Design	4	100
BCA C3005	Probability and Statistics	4	100
Sessional			
BCA P3006	Data and File Structure Lab	1	50
BCA P3007	Java Programming Lab	1	50

Semester – IV

Paper Code	Title	Credit	Marks
BCA C4001	Computer Graphics and Multimedia	4	100
BCA C4002	Operating System Concept and Network Management	5	100
BCA C4003	Software Engineering	4	100
BCA C4004	Visual Programming	5	100
BCA C4005	Data Communication and Computer Network	5	100
Sessional			
BCA P4006	Computer Graphics and Multimedia Lab	1	50
BCA P4007	Visual Programming Lab	1	50

Semester – V

Paper Code	Title	Credit	Marks
BCA C5001	Internet Concept and Web Design	4	100
BCA C5002	Design and Analysis of Algorithm	5	100
BCA C5003	Linux Programming	5	100
BCA C5004	Computer Oriented Numerical Methods	5	100
	Elective – I	4	100
Sessional			
BCA P5005	Internet Concept and Web Design Lab	1	50
BCA P5006	Numerical Method Lab	1	50

Semester – VI

Paper Code	Title	Credit	Marks
BCA C6001	Optimization Technique	5	100
BCA C6002	Principle of Management	4	100
BCA C6003	Accounting and Financial Management	5	100
BCA C6004	Computer Network Security	4	100
	Elective – II	5	100
Sessional			
BCA C6005	Project	2	100

Elective – I

BCA E5007- E – Commerce

BCA E5008 -Software Testing

BCA E5009 -Soft Computing

Elective – II

BCA E6006- Management Information System

BCA E6007 -Artificial Intelligence

BCA E6008 - Bio-Informatics

Supportive Courses

Supportive courses for choice of student from other disciplines. The following courses will be taught to students of University Department of Computer Applications as well as of other discipline depending of their choice (any one) which will be limited to a maximum of 40 students. These courses will be offered during the fourth semester of the master program. A student will be allowed to opt for one course only the credit of which will be 5. This will not be included in the calculation of CGPA.

1. Windows

2. M.S. Office
3. Tally
4. Photoshop
5. Internet concept

The Cumulative Grade Point Average (CGPA) will be calculated on the 10 point grading scale as follows:

Grade Point	Parentage of Marks	Grade Symbol (Letter)
10	91 – 100	O (Outstanding)
09	81 –90	A+ (excellent)
08	71 –80	A (Very Good)
07	61 –70	B+ (Good)
06	51 –60	B (Above Average)
05	41 –50	C (Average)
04	33 –40	P (Pass)
00	Below 33	F (Fail or Absent)

A. For each Semester:

Semester Grade Point Average (SGPA)

$$S(j) = \frac{\sum_i C(i).G(i)}{\sum_i C(i)} \quad (i)$$

Where C(i) denotes the total credits of the ith course. G(i) denotes the grade point earned by a student in ith course and j indicates the semester.

B. For full course

$$\text{Cumulative Grade Point Average CGPA} = \frac{\sum_j C(j).S(j)}{\sum_j C(j)} \quad (ii)$$

Where C(j) denotes the total credits of the jth semester. S(j) denotes the SGPA of the jth semester.

JHARKHAND, 825301
(DEPARTMENT OF COMPUTER APPLICATION)
REGULATIONS
FOR BACHELOR OF COMPUTER APPLICATION (BCA)

(A) Preamble

1. The regulations herein specified applied to Bachelor of Computer Applications (BCA) programme offered by the Vinoba Bhave University, Hazaribag, through the University Department of Computer Applications.
2. The BCA programme covered by these regulations are correlated courses of study, the successful completion of which would enable the participants of the programme to qualify for the award of BCA degree.
3. A participant of the programme is a student who is duly admitted to an institute of the university and who has registered himself/herself for a course of study and attains the same.

(B) Time scale for academic activity

4. The basic units of time for academic activity for the BCA programme shall be a semester (July to December and January to June). A basic contact period is one in which a teacher engages the student for a duration of 60 minutes.
5. If circumstances warrant, the department may schedule a summer programme during long vacation of the department. There will be in general no formal classes in the summer programme.

(C) Courses of study

6. The university shall offer courses during a semester indicated mainly from consideration of minimum enrollment and facilities available. The competent authority comprising of the University/Department shall have the right to cancel any or all course of study if the requirements are not satisfied.

(D) Registration for course of study

7. Every participant of the BCA programmes, shall first register himself/herself for the courses of study he/she intends pursuing provided he/she possesses the minimum qualifications as laid down and his/her plan is approved by the University in the University Department of Computer Applications.
8. Fees payable by the participants including fees payable for examination shall be as laid down in administrative instructions issued from time to time by the University/Department for the purpose.

(E) Audit of the courses

9. All courses offered in the BCA programme will be open for audit in the spirit of offering an opportunity for continuing education for the participants who wish to refresh or update their knowledge. Audited courses shall neither count for academic credit nor shall there be any examination requirements. Participants shall be eligible to participate in the courses offered on payment of prescribed fee and due registration.

- (F) Measurement of Academic Achievement of the participating student in the BCA programme shall be measured in terms of grade obtained by him/her in the examinations. The overall performance of the students in the semester examination shall be evaluated in terms of grade point average as specified later.**

(G) Assessment:

In total 150 credits represent the workload of a session for BCA program.

Total credits=150, 1 credit = 15 lecture Hrs, 100 Marks SUBJECT(L-T-P) = (4-1-0)

CREDITS and SESSIONAL (L-T-P) = (0-0-1) CREDITS

Semester	–	I	25 credits
Semester	–	II	25 credits
Semester	–	III	25 credits
Semester	–	IV	25 credits
Semester	–	V	25 credits
Semester	–	VI	25 credits

(H) Scheme of Instruction:

The scheme of instruction in Under-Graduate Programme shall be of the following forms of academic activity:

- a) Theory
- b) Sessional
- c) Practical Training and Project Work
- d) Seminar and Tutorial

a) Theory

A theory type of academic activity shall involve concepts, fundamental ideas, and techniques, as laid down in text books or literature and which can be grasped through lectures and assignments.

A theory type of course with about 60 contact periods in a semester shall enable participating student to earn one unit of academic credit provided that he/ she fulfils the attendance, and grade requirements as specified hereinafter.

b) Sessional

The following type of academic work will be covered in sessional:

- a) Laboratory Experiment
- b) Design Exercise
- c) Project
- d) Term paper or any other academic work, the purpose of which would be to train the student by practice, repeated use and hands on experience.

A sessional course of 2 contact periods a week and about 30/40 contact period during a semester shall enable a participating student to earn one unit of academic credit provided that he/she fulfils the attendance and grade requirements as specified hereinafter.

c) Practical Training and Project Work:

At the end of the sixth semester of study, a student will be examined in the course" Project

Work".

1. Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Director of the Institute by April. Whenever possible, a separate file containing source-code listings should also be submitted. Every student should also submit at least 4 typed copies of their project synopsis.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs and a list of output reports should be included.
4. The project Work should be of such a nature that it could prove useful or be relevant from the commercial/management angle.
5. The project report will be duly accessed by the internal guide of the subject and marks will be communicated by the Director to the University along with the marks of the internal credit for theory and practical to be communicated for all other courses.
6. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.
7. The project work carry 30 marks for internal assessment and 70 marks for external viva. The external viva shall be conducted by a minimum of two external examiners. The mini project work would be departmental.
8. Project work can be carried out in the Institute or outside with prior permission of the Institute.
9. Project viva-voce by the University panel will be conducted in the month of May.

(I) Attendance Requirement

All students must attend every lecture, practical classes and other activities of the Department. However, the attendance requirement will be a minimum of 75% of the classes actually held.

1. Absence during the semester

- a. A student must inform the HOD concerned immediately of any instance of continuous absence from classes.
- b. A student who is absent due to illness should approach the teachers concerned for make up quizzers, assignment and laboratory work.
- c. A student has been absent from a sessional test due to illness approach the teacher concerned for make up test immediately on return to class. The request should be supported with a medical certificate issued by a registered medical practitioner.
- d. If a student is continuously absent from the institute for more than four weeks without permission of the head of the department concerned, his/her name will be removed from institute rolls.

(J) Examination Assessment

- 1) The examination of each paper shall have two components- External evaluation (End Semester Exam) at the end of the semester carrying 70 marks to be conducted by the university and Internal evaluation of 30 marks to be evaluated by Teachers. Internal evaluation shall comprise written exam carry 20 marks of a paper. Seminars/Cultural activities/NSS be 5 marks and 5 marks for assignment.

Theory Paper----- 70 marks + 30 marks

70 marks ----- External evaluation (End Semester Exam)

30 marks----- Internal evaluation

- 2) Sessional Exam----- 50 Marks

There should be one External for each sessional Examination.

- 3) Question Paper Pattern:

The questions papers shall be set and the answer –scripts shall be evaluated by the teachers of the concerned courses. The question paper shall consists of two sections: A & B. Section A will have 08 long questions from the entire units of the syllabus, out of which 04 questions will be required to be answered and will carry 10 marks each. Section B will consists of 10 short answer type questions which will cover the entire syllabus uniformly and will carry 30 marks in all, each short-answer type questions carrying 3 marks. The candidates are required to give answer of each short type question in 50 words i.e 7-10 lines.

(K) Student Discipline

Every student is required to observe a polite and disciplined behavior both inside and outside the campus and should not indulge in any activity which would tend to bring down the prestige of the institute or disturb the peaceful and congenial environment of the campus.

An act of indiscipline on the part of the student may result into adequate discredit and a mention in his/her academic grade card and/or transcript.

Note:

The department in consultation with the university shall have the right to change/modify any regulation or part thereof in the academic interest of the students.

(L) Duration of Curriculum and Calendar:

1. Bachelor of Computer Applications (BCA) programme is of three years duration. Each year shall be divided into two semesters. First semester shall ordinarily being in July and end in December. Second semester shall ordinarily being in January and end in June.
2. Each year, the university shall draw an academic calendar and the same shall be non negotiable and strictly adhered to the academic calendar for the first year shall be handed over to each admitted student along with his/her university registration card. Second year academic calendar shall be made available during registration for third semester and third year calendar during registration for fifth semester.
3. The curriculum and syllabus shall be modified with approval of the academic council ordinarily once in every three years to keep the same up-to-date. However, minor modifications can be done as and when necessary with the approval of Vice-Chancellor. The modification so done shall be placed to the immediate next academic council meeting for rectification.

4. A candidate may be permitted to complete BCA degree requirements in not more than 5 years i.e. maximum in 10 semesters.

(M) Eligibility Criteria For Admission:-

1. A candidate will be eligible to join First Semester of BCA Course, if he/she has passed 10+2 examinations or Intermediate or any other equivalent examination with a minimum of 45% aggregate in any discipline (Arts, Commerce, Science) with mathematics as one of the subjects.
Note: Passed in mathematics
2. At the time of the counseling candidates will be required to show their original certificates and marksheets of 10+2/Intermediate or equivalent, caste certificate and any special category certificate, if any and other relevant document

(N) Eligibility for Appearing in Semester Examination

1. A student shall be eligible in an examination provided he/she pursues a regular course of study and attends at least 75% of class in each theoretical and sessional subject during the semester. The attendance shall be considered from the date of admission of the candidate in the institution. Attendance record will be compiled at the time of each test and the students with poor attendance will be informed through notification. The guardian will also be informed through a letter before he/she is debarred for appearing university examination due to shortage of attendance.
2. Concessions: A student who has been absent for short periods on medical ground or due to participation in cultural, sports, other academic/official assignments in the interest of the Department/University with prior written permission of the head of the institution shall be permitted a maximum of additional concession of 10% in attendance and shall be eligible for appearing in examination with a minimum 65% of attendance in semester.
3. A student shall be admitted to any examination in a subject only if he/she has been registered for that subject.
4. A candidate shall be allowed in an examination only if he/she is issued an admit card for the relevant examination by the University/Department.

(O) PROMOTION

Advancement to the next Semester shall be permitted only with a maximum of Two Backlog Papers from the preceding Semester. Further, entry to the next Semester shall be regulated at the level of 4th, 5th and 6th Semesters as explained under:

1. Admission to 4th Semester shall be allowed only after clearing First Semester Backlog Paper(s) during Third Semester.
2. Admission to 5th Semester shall be allowed only after clearing Second Semester Backlog Paper(s) during 4th Semester.
3. Admission to 6th Semester shall be allowed only after clearing Third Semester Backlog Paper(s) during 5th Semester.
4. Backlog paper(s) of 4th Semester needs to be cleared during 6th Semester.
5. Backlog paper(s) of 5th and 6th Semesters need to be cleared during subsequent examinations for these semesters within three consequent examinations of the concerned semester with a maximum of only one chance.

Moderation of result: Notwithstanding anything contained elsewhere in the Regulations, the University shall have power to moderate the BCA results on the recommendations of the Examination Board and/or the academic council.

Normally an examinee shall be awarded up to five marks in one theory paper or three marks in two theory papers (each). If he/she fails short of pass marks in semester exam (first to fifth) or up to five marks in the aggregate. There should not be more than one benefits.

Provided further that no grace marks shall be permitted in the Practical/Viva-Voice paper.

(P) Final Result

The Cumulative Grade Point Average (CGPA) will be calculated on the 10 point grading scale as follows:

Grade Point	Percentage of Marks	Grade Symbol (Letter)
10	91 – 100	O (Outstanding)
09	81 –90	A+ (excellent)
08	71 –80	A (Very Good)
07	61 –70	B+ (Good)
06	51 –60	B (Above Average)
05	41 –50	C (Average)
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00	Below 33	F (Fail or Absent)

For each Semester:

Semester Grade Point Average (SGPA)

$$S(j) = \frac{\sum_i C(i).G(i)}{\sum_i C(i)} \quad (i)$$

Where C(i) denotes the total credits of the ithcourse. G(i) denotes the grade point earned by a student in ith course and j indicates the semester.

For full course:

$$\text{Cumulative Grade Point Average CGPA} = \frac{\sum_j C(j).S(j)}{\sum_j C(j)} \quad (ii)$$

Where C(j) denotes the total credits of the jthsemester. S(j) denotes the SGPA of the jth semester.

Other:

- a) Other provisions not covered under the present regulation shall be governed by the regulation for BACHELOR Examination in Arts, Science and Commerce of the university and may, if needed be reviewed.
- b) Any dispute or case not covered under the above regulations shall be referred to the Vice Chancellor whose decision shall be final.

**COMMUNICATION SKILLS
BCA-F1001**

UNIT 1: Communication Overview

Introduction to Communication, Development of communication, Principles of Communication, Process of Communication, Barriers to Communication, Aids to Communication, The Ten Commandments, The Listening Process, Difference between Listening and Hearing, Types of Listening, Deterrents to the Listening Process, Factors that help in Listening, Strategic Manoeuvres, Effective Presentations, Seven steps to a Successful Presentation.

UNIT 2: Grammar and comprehension

Syntax - Use of Articles in Science, The Verbs, The Prepositions, Tense, Active and Passive Construction, Common Errors, Phrase Substitution, Double blanks in a Sentence, Sentence Rearrangement, Closure Test, Antonyms and Synonyms, Comprehensions

UNIT 3: Business correspondence

Drafting official and business letter, Circulars and official order instructions, Drafting minutes and agenda of the meeting, Formal report, Summarizing and abstracting, Expressing ideas within a restricted word limit(Precise Writing), Paragraph writing, Application Letter, Technical description of things and processes, Use of Charts, Graph and Table

UNIT 4: Advanced phonetics

phonology and morphology including supra segmental features stress and intonation, Developing fluency and accuracy in oral communications, Authentic Pronunciation, English Phonetics spelling, Drilling and Testing of English sounds. I.C. Analysis

UNIT 5: Group discussions And Interviews

Introduction to Group Discussion, qualities looked for in GD, Strategies For GD, Use of persuasive strategies including some rhetorical devices (for emphasizing for instance being polite and firm handling questions and taking in criticism of self), Effective interview, Enrichment of English Vocabulary - Borrowings, Words formation and its methods.

Text Book:

1. Effective Communication Skills: The Foundations for Change by John Nielsen

Reference Books:

1. Business Correspondence & Report Writing, Sharma, TMH Pub.
2. Business Communication, Kaul, PHI Publication.

BASIC MATHEMATICS-I

BCA-F1002

UNIT – 1: Differential Calculus

Successive differentiation, Leibnitz Theorem, Taylor's theorem with Lagrange's forms of remainders, Expansion of a function of one variable in Taylor's and Maclaurin's infinite series. Maxima and Minima of one variable, partial Derivatives, Euler's theorem, change of variables, total differentiation, Errors and approximation. Taylor's series in two variables. Maxima and Minima of two or more variables.

UNIT – 2: Integral Calculus

Definite integral and its application for area, length and volume. Multiple integrals. Change of order of integration. Transformation of integral from Cartesian to polar. Applications in areas, volume and surfaces.

UNIT – 3: Differential Equation

First degree and first order Differential equation : Higher order differential equation with constant coefficients. Linear partial differential equation of first order P.D.E. of higher with constant coefficients.

Test Books:

1. Das BC and Mukherjee, Differential Calculus, Calcutta, U.N. Dhar Publishers.
2. Das BC and Mukherjee, Integral Calculus, Calcutta, U.N. Dhar Publishers.
3. Grewal B.S., Higher Engineering Mathematics, Delhi Khanna Publishers.

BUSINESS PRACTICES AND MANAGEMENT

BCA F1003

UNIT - I

Concepts of Business, Commerce and Industry, Business Environment- Macro and Micro Environment, Business System, Forms of Business Organization - Sole trader, Partnership, Companies HUF and Co-operative organization.

UNIT-II

Organization structure-Meaning and importance, Nature and Types of Organization, Forms of Organization, Formal and Informal Organization, Line and staff Agency, Theories of Organization- Human Relations theory, Bureaucratic theory, System theory and Contingency theory of organization.

UNIT-III

Management- Meaning, definition and importance, Management concept, functions, Principles of management and Management Process. Planning- concepts and its types, Decision making concept, Management by objectives (M.B.O.). Motivation-Concepts and theories, Leadership- Concepts and styles.

UNIT-IV

Organizing- Concepts, Nature and Significance, Authority and responsibility, Centralization and Decentralization, Communication Nature, Process and types of communication networks. Managerial control - concepts and Process, Techniques of control.

Text & Reference Books:

1. Sharma Sudhir and Bansal, "Principles of Management", Anamika Publishers.
2. Sharma, R. K. and Gupta, S. K., "Business Organisation and Management", Kalyani Publishers.
3. Sharma, N. K., "Current issues in Management", Indus Valley Publication.
4. Singh, U.K. and Dewan J.M., "Business Management", Management Executives Handbook Series.
5. Michael A. Hitt, Black, J. Stewart, "Management", Pearson Education.

INTRODUCTION TO COMPUTER SCIENCE

BCA – C1004

Unit 1: Introduction To Computers & Number Systems And Logic Gates

Introduction, Characteristics of computers, Evolution of computers, Generation of Computers, Classification of Computers, The Computer System, Applications of Computers. Introduction, Number Systems, Conversion between Number Bases, Arithmetic System, Signed and Unsigned Numbers, Concept of Overflow, Binary Coding, Logic Gates, Boolean Algebra, Combination of Logic Gates. **Unit**

2: Computer Architecture & Primary Memory

Introduction, Central Processing Unit (CPU) Memory, Communication between Various Units of a Computer System, The Instruction Format, Instruction Set, Processor Speed, Multiprocessor Systems. Introduction, Memory Hierarchy, Random Access Memory (RAM), Types of RAM, Read Only Memory (ROM), Types of ROM.

Unit 3: Secondary Storage, Input & Output Devices

Introduction, Classification of Secondary Storage Devices, Magnetic Tape, Magnetic Disk, Optical Disk, Magneto Optical disk. Introduction, Keyboard, Pointing Devices, Speech Recognition, Digital Camera, Scanners, Optical Scanners. Introduction, Classification of Output, Hard Copy Output Devices, Printers, Plotters, Computer Output Microfilm (COM), Soft Copy Output Devices, Monitors, Audio Output, Projectors, Terminals.

Unit 4: Computer Program, Languages

Introduction, Developing a Program, Algorithm, Flowchart, Pseudocode (P-Code). Introduction, Evolution of Programming Languages, Classification of Programming Languages, Generations of Programming Languages, Features of a Good Programming Language, Selection of a Programming Language.

Unit 5: Computer Software, Operating System

Introduction, Software : Definition, Relationship between Software and Hardware, Software Categories, System Software, Application Software, Software Terminology. Introduction, Operating System, Evolution of Operating System, Types of Operating System, Functions of an Operating System, Modern Operating Systems.

Unit 6: Data Communication ,Computer Network & Internet Basics

Introduction, Data Communication, Transmission Media, Multiplexing, Switching, Computer Network, Network Topologies, Communication Protocols, Network devices. Introduction, Evolution of Internet, Basic Internet Terms, Getting Connected to Internet, Internet Applications, Electronic Mail : An Introduction How E-Mail Works, Searching the Web (Search Engines), Languages of Internet, Internet and Viruses.

Text Book:

1. Introduction to computer Science, ITL Education solution Limited, R&D Wing, PEARSON Education, Edition 2004

Reference Book:

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

PROBLEM SOLVING AND PROGRAMMING IN C

BCA- C1005

Unit 1: History and Importance of C, Sample programming, Basic Structure and execution of C programmes, Constants, Variables, and Data Types and various type of declarations, Different type operators and Expressions, Evaluation of Expressions, Operator Precedence and Associability, Mathematical Functions.

Unit 2: Managing Input and Output operations, Decision Making and Branching Decision Making and Looping. One – dimensional Arrays and their declaration and Initializations, Two-dimensional Arrays and their initializations, Multidimensional Arrays, Dynamic Arrays, String Variables, Reading and Writing Strings, Arithmetic Operations on characters, Putting Strings together, Comparison of Two Strings, String – handling functions, Table and other features of Strings.

Unit 3: Need and Elements for user –defined Functions, Definition of Functions, Return values and their types, Function calls and Declaration, Arguments and corresponding return values, Functions that return multiple values, Nesting of functions, Recursion, Passing arrays and strings to functions, The Scope, Visibility and Life time of variables.

Unit 4: Defining Structure, Declaring Structure Variable and Accessing Structure Members, Initialization of Structure, Comparing Structure Variables, Operation on Individual Members, Arrays of Structures, Structures within structures, Structures and Functions, Unions, Size of Structures, Bit Fields.

Unit 5: Understanding Pointers, Accessing the Address of a Variable, Declaration and Initialization of Pointer Variables, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays, Pointers and Character Strings, Arrays of Pointers, Pointers and Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers and Structures, File Management in C.

Text Book :

1. E. Balagurusamy – Programming in ANSI C, 3rd Edn. , TMH, New Delhi ; 2004

Reference:

1. Programming with C, B.S.Gottfried (TMH)

2. Y. Kanetkar – Let us C, 4th Edition, BPB Publication , New Delhi; 2002

COMPUTER BASICS & PC SOFTWARE LAB

BCA P1006

Experiment problems of Computer Basics & PC Software lab will be from the theory classes of BCA C1004.

C PROGRAMMING LAB

BCA P1007

Experiment problems of C Programming lab will be from the theory classes of BCA C1005

BASIC MATHEMATICS-II

BCA-F2001

Unit 1: ABSTRACT ALGEBRA

Group, Subgroups, Ring, Integral Domain, Field and Introduction of Boolean Algebra.

Unit 2: LINEAR ALGEBRA

Spaces and Subspaces, Basic and Dimension of Vector Spaces, Linear Transformation, Their Nullity and Rank.

Unit 3: MATRIX ALGEBRA

Elementary Transformation, Inverse of a Matrix by Row Operation, Rank, Solution of a System of Linear Simultaneous Equation by Matrix Methods, Eigen Values and Eigen Vectors, Quadratic Forms.

Unit 4: ANALYTICAL GEOMETRY OF 3-DIMENSIONS

Rectangular, Spherical, Wpolar and Cylindrical Coordinates, Direction Cosines, Planes, Straight Lines, Shortest Distance Between Two Skew Lines, Sphere.

TEXT BOOKS:

1. "Modern Algebra" By A.R.Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.
2. "Matrices" By A.R.Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.
3. "Analytical Geometry of The Dimensions" By Dasguta Prasad, Bharti Bhawan
4. "Advanced Course in Modern Algebra" By Prof Dr.K.K.Jha, New Bharat Prakashan Delhi- 6.
5. "Krishna Series" Analytical Geometry of three Dimension" By A.R.Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.

ENVIRONMENTAL SCIENCE

BCA – F2002

UNIT – 1: Environmental awareness, Ecology and Environment:

Multidisciplinary nature of environmental science, Definition, scope, importance and need for public awareness. Concept of an ecosystem, structure and function of an ecosystem, producer, consumer and decomposer, energy and nutrient flow biogeochemical cycles, food chain, food web, ecological pyramid.

UNIT – 2: Environmental Pollution

Segments of environment, sources, pathways and fate of environmental pollutants, causes of environmental pollution, physical, chemical, and biological transformation of pollutants, population explosion, environment and human health, human rights, value education, women and child welfare.

UNIT – 3: Air Pollution

Various segments of atmosphere and their significance, classification of air pollutions, toxic effects, sampling and analysis, stationary and mobile emission, sources and their control, photochemical smog, sulphurous smog, green house effect, global warning, ozone depletion, Air (prevention and control of pollution) Act.

UNIT – 4: Water Pollution

Water resources sources of water pollution, various pollutants, their toxic effect, portability of water, municipal water supply, disinfection, characteristics of waste water, primary and secondary waste water treatment, BOD and COD measurement and their significance, rain water harvesting, water shed management, Water (pollution and control) Act.

UNIT – 5: Natural Resources and Biodiversity

Renewable and non renewable resources, Forest resource, consequences of deforestation, floods and draughts, equitable use of resources for sustainable development, Dams benefits and problems, Biodiversity: ecosystem diversity, threats to biodiversity, conservation of biodiversity. A Brief introduction to Noise Pollution, Soil Pollution , Solid Water Management.

Recommended Books :

1. De A. K., Environmental Chemistry, Wiley Eastern Ltd.
2. Miller T.G.Jr., Environmental Science, Wadsworth Publishing Co. (TB)
3. Sharma B.K., 2001, Environmental Chemistry, Goel Publishing House, Meerut
4. Odum, E.P., 1971, Fundamentals of Ecology, W.B.Sanders Co. U.S.A.

DATABASE MANAGEMENT SYSTEM

BCA - C2003

Unit 1: Introduction to Databases and Transactions What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management.

Unit 2: Data Models the importance of data models, Basic building blocks, the evolution of data models, Degrees of data abstraction.

Unit 3: Database Design, ER-Diagram and Unified Modeling Language Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML Relational database model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

Unit 4: Relational Algebra and Calculus Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

Unit 5: Constraints, Views and SQL What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations.

Unit 6: Transaction management and Concurrency control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), database recovery management.

TEXT BOOKS:

1. Fundamental of Database Systems- Elmasri Navathe- Pearson Education Asia
2. Database- Principles, Programming and Performance- Parick O' Neil Elizabeth O' Niel, Harcourt Asia PTE Limited

REFERENCES BOOKS:

1. An Introduction to Database Systems- C.J.Date, Addison Wesley, Pearson Education Press
2. Database System Concepts- Abraham Silberschat, Henry F. Korth, S.Sudarshan, Tata McGraw Hill.

OBJECT ORIENTED PROGRAMMING USING C++

BCA-C2004

Unit 1: Introduction , Basic terms and ideas

Introducing Object – Oriented Approach, Relating to other paradigms {Functional, Data decomposition}. Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators.

Unit 2: Classes and Objects

Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behaviour of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, Metaclass / abstract classes.

Unit 3: Inheritance and Polymorphism

Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, Parameteric Polymorphism

Unit 4: Generic function , Files and Exception Handling

Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance. Streams and files, Namespaces, Exception handling, Generic Classes

Referential Books:

1. A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997.
2. S.B.Lippman & J.Lajoie, “ C++ Primer”, 3rd Edition, Addison Wesley, 2000.The C programming Lang., Person Ecl – Dennis Ritchie
3. R.Lafore, “Object Oriented Programming using C++”, Galgotia Publications, 2004
4. D.Parsons, “Object Oriented Programming using C++”, BPB Publication.

LOGIC DESIGN

BCA-C2005

Unit 1: Binary Systems, Boolean Algebra and Logic Gates

Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic. Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Operations, Digital Logic Gates, Integrated Circuits.

Unit 2: Gate - Level Minimization

The Map Method, Four - Variable Map, Map, Product of Sums Simplification, Don't - Care Conditions, NAND and NOR Implementations, Other Two- Level Implements, Exclusive - OR Function.

Unit 3: Combinational Logic

Combinational Circuits. Analysis Procedure, Design Procedure, Binary Adder - Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

Unit 4: Synchronous Sequential Logic

Sequential Circuits, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure.

Unit 5: Registers and Circuits & Memory and Programmable Logic

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters. Introduction, Random-Access Memory, Memory Decoding, Read-Only Memory, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.

Text Book:

M.Morris Mano- Digital Design, 3rd Edn, Pearson Education, New Delhi - 2005.

Reference Book:

A.B.Marcovitz- Introduction to Logic Design, TMH, New Delhi - 2002.

C++ Programming Lab
BCA P2006

Experiment problems of C++ Programming lab will be from the theory classes of BCA C2004

Database Management System Lab
BCA P2007

Experiment problems of Database Management System lab will be from the theory classes of BCA C2003

DATA STRUCTURE USING C

BCA-C3001

Unit 1: Introduction to Data Structure and its Characteristics

Array

Representation of single and multidimensional arrays; Sparse arrays – lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also.

Unit 2: Stacks and Queues

Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

Unit 3: Lists

Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers

Unit 4: Trees

Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree.

Unit 5: B-Trees

Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree.

Unit 6: Sorting Techniques

Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear search, binary search and hashing.

Referential Books:

1. E.Horowitz and S.Sahani, “ Fundamentals of Data structures”, Galgotia Book source Pvt. Ltd., 2003
2. R.S.Salaria, “ Data Structures & Algorithms” , Khanna Book Publishing Co. (P) Ltd.,2002
3. Y.Langsam et. Al., “ Data Structures using C and C++” , PHI, 1999

JAVA PROGRAMMING

BCA- C3002

Unit 1: Java Evolution and Overview of Java Language

How Java differs from C and C++, Java and Internet, Java and World Wide Web, Introduction, Simple Java Program, More of Java, An Application with Two Classes, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values of Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.

Unit 2: Operators and Expressions & Decision Making and Branching

Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators, Type Conversion in Expressions, Operator Precedence and Associativity, Mathematical Functions. Introduction, Decision Making with if Statement, Simple if Statement, The if... else Statement, Nesting of if ... else Statements, The else if Ladder, The switch Statement, The ?: Operator.

Unit 3: Decision Making and Looping & Classes, Objects and Methods

Introduction, The while Statement, The do Statement, The for Statement, Jumps in Loops, Labelled Loops. Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class, Overriding Methods, final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.

Unit 4: Arrays, String and Vectors & Interfaces

Arrays, One-Dimensional Arrays, Creating an Array, Two-Dimensional Arrays, Strings, Vectors, Wrapper Classes. Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables.

Unit 5: Packages & Multithreaded Programming

Putting Classes Together: Introduction, Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes. Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization.

Unit 6: Managing Errors and Exceptions in Java:

Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.

Text Book:

1. E. Balagurusamy, Programming with Java, A Primer Second Edition, Tata McGraw Hill, New Delhi.

Reference Books:

1. H.M.Deitel & P.J.Deitel- JA V A- How to Program, 5th Edn, Pearson Education, New Delhi-2004.
2. P.Naughton and H. Schildt-JAVA: The Complete Reference, TMH, New Delhi 2005.

COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE

BCA-C3003

Unit 1: Basic computer organization and design, Instructions and instruction codes, Timing and control/ instruction cycle, Register/ Types of register/ general purpose & special purpose registers/ index registers, Register transfer and micro operations/ register transfer instructions, Memory and memory function, Bus/ Data transfer instructions, Arithmetic logic micro-operations/ shift micro-operations, Input/ Output and interrupts, Memory reference instructions, Memory interfacing memory/ Cache memory.

Unit 2: Central Processing Unit

General Register Organization/ stacks organizations instruction formats, addressing modes, Data transfer and manipulation. Program control reduced computer, pipeline/ RISC/ CISC pipeline vector processing/ array processing.

Arithmetic Algorithms: Integer multiplication using shift and add, Booth's algorithm, Integer division, Floating-point representations.

Unit 3: Computer Arithmetic

Addition, subtraction and multiplication algorithms, divisor algorithms. Floating point, arithmetic operations, decimal arithmetic operations, decimal arithmetic operations.

Unit 4: Input – Output Organization

Peripheral devices, Input/output interface, ALU Asynchronous Data transfer, mode of transfer, priority interrupts, Direct memory Address (DMA), Input/ Output processor (IOP), serial communication.

Unit 5: Evaluation of Microprocessor

Overview of Intel 8085 to Intel Pentium processors Basic microprocessors, architecture and interface, internal architecture, external architecture memory and input/ output interface.

Assembly language, Assembler, Assembly level instructions, macro, use of macros in I/C instructions, program loops, programming arithmetic and logic subroutines, Input-Output programming.

Referential Books:

1. Leventhal, L.A, "Introduction to Microprocessors", Prentice Hall of India
2. Mathur, A.P., "Introduction to Microprocessors" , Tata McGraw Hill
3. Rao,P.V.S., "Prospective in Computer Architechture" , Prentice Hall of India

SYSTEM ANALYSIS AND DESIGN

BCA- C3004

Unit 1: System concepts: Definition, Characteristics, Elements of system, Physical and abstract system, open and closed system. System development Life Cycle: Various phases of system development, Considerations for system planning and control for system success, system planning.

Unit 2: Initial investigation & Feasibility study: Determining users requirements and analysis, fact finding process and technique. Determination of Feasibility Study, Technical, Operational & Economic Feasibilities, Data Analysis, Cost and Benefit Analysis.

Unit 3: Tools of Structured Analysis: Data Dictionary, form, Gantt charts, System Model, Pseudo codes, Flow chart, System flow chart, Decision Tree Decision Tree, Decision Tables.

Unit 4: User Manual, Programming manual, Operator manual, System testing and Quality Assurance, Software maintenance. Threat and Risk Analysis.

Text Book:

1. V.K. Jain, System Analysis and Design, 2010, DreamTech Press.

Reference Books:

1. Perry Edwards, Systems Analysis & Design, 2010, McGraw Hill.

PROBABILITY AND STATISTICS

BCA-C3005

Unit 1: Probability

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

Unit 2: Probability Distribution

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

Unit3: Statistics & Measures of Central Tendency

Definition, Function & Scope of Statistics. Arithmetic Mean, Weighted A.M., Median, Mode, Geometric & Harmonic Mean and Their Merits & Demerits.

Unit 4: Measures of Variation: Range, The Interquartile Range or Quartile Deviation, Average(Mean), Deviation Standard Deviation, Coefficient of Variation, Skew ness, Moments & Kurtosis.

Unit 5: Correlation Analysis: Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient.

Unit 6: Regression Analysis: Difference Between Correlation & Regression, Regression Lines, Regression Equations, Regressions Coefficient.

Unit 7: Sampling Distribution: Chi Square (X^2) Distribution and Its Properties, Chi - Square Test, Application of Chi -Square Distribution: Chi-Square Test for Population Variance, Chi-Square Test of Goodness of Fit, Independence of Attributes, T- Distribution & Its Properties, Application of T - Distribution to Testing Hypothesis About Population Mean, Differencen Between Two Means, Correlation Coefficient, F- Distribution.

Text Books:

1. S.P. Gupta & M.P. Gupta, "Business Statistics", Sultan Chand & Sons.
2. S.C. Gupta & V.K. Kapoor, "Fundamental of Mathematical Statistics", Sultan Chand & Sons.

DATA AND FILE STRUCTURE LAB
BCA P3006

Experiment problems of Data and File Structure lab will be from the theory classes of BCA C3001

JAVA PROGRAMMING LAB
BCA P3007

Experiment problems of Data and File Structure lab will be from the theory classes of BCA C3002

COMPUTER GRAPHICS AND MULTIMEDIA
BCA-C4001

Unit 1: Overview of Graphics Systems

Video Display Devices, Refresh Cathode Ray Tubes, Raster-Scan and Random-Scan Systems, Input Devices, Hard-Copy Devices and Graphics Software.

Unit 2: Output Primitives

Points, Line Drawing Algorithms (DDA and Bresenham's Line Drawing Algorithm), Circle- Generating Algorithms (Bresenham's and Midpoint Circle Algorithms), Ellipse-Generating Algorithms (Midpoint Ellipse Algorithm only), Filled- Area Primitives: Scan-Line Polygon Fill Algorithm, Boundary-Fill Algorithm, Flood-Fill Algorithm.

Unit 3: Two Dimensional Geometric Transformations

Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Reflection and Shear, Transformations between Coordinates Systems, Raster Methods for Transformations.

Unit 4: Two-Dimensional Viewing

The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-View Port Coordinate Transformation, Clipping- Point, Line (Cohan-Sutherland Line Clipping)

Unit 5: Multimedia Systems Design

Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Data Interface Standards, the Need for Data Compressions, Multimedia Database.

Text Books:

1. D. Hearn & M. P. Baker -Computer Graphics C Version, 2nd Edn, Pearson Education, New Delhi, 2006
2. J. F. Koegel Buford -Multimedia Systems, Pearson Education, New Delhi, 2006

Reference Books:

1. R.A. Plastock et.al.- Computer Graphics(Schaums Outline Series), 2nd Edn, TMH, New Delhi, 2006.
2. J.D.Foley- Computer Graphics, 2nd Edn, Pearson Education, New Delhi, 2004

OPERATING SYSTEM CONCEPT AND NETWORK MANAGEMENT BCA-C4002

Unit 1: Introduction & Computer-System Structures

What is an Operating System? Mainframe Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Clustered Systems, Real- Time Systems. Operation, I/O Structure, Storage Structure, Storage Hierarchy.

Unit 2: Operating-System Structures

System Components; Operating-System Services; System Calls; System Programs; System Structure, System Design and Implementation, System Generation.

Unit 3: Processes & CPU Scheduling:

Process Concept; Process Scheduling, Operations On Processes. Basic Concepts; Scheduling Criteria; Scheduling Algorithms.

Unit 4: Storage Management & File-System Interface:

Memory Management- Backward, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging. File Concept; Access Methods; Directory Structure; Protection. File-System Structure; File-System Implementation; Directory Implementation; Allocation Methods, Free-Space Management.

Unit 5: Mass-Storage Structure: Disk Structure; Disk Scheduling; Disk Management; Swap-Space Management.

Unit 6: The Linux System & Network Administration Using Linux

History; Design Principles; Kernel Modules; Process Management; Scheduling; Memory Management; File Systems; Input And Output; Security. Role and responsibilities of Network Administrator, Linux and TCP/IP Internetworking concepts.

Unit 7: Network Administration Activities & Network Configuration and Setting

Basic Troubleshooting. Configuring Networks, Dynamic Host Configuration Protocol, Domain Name System (DNS), Network File System (NFS), Web Server (Prefer Samba Server).

Text book:

1. A. Silberschatz et.al.-Operating System Concepts , 6th Edition, John Wiley Inc., 2003

Reference books:

1. H.M. Deitel -Operating Systems , 6th Edition, Pearson Education, 2006

2. D.M. Dhandhare - Operating Systems, 2nd Edition, Tata McGraw Hill, New Delhi, 2006

SOFTWARE ENGINEERING BCA-C4003

Unit 1: Introduction to Software Engineering: Characteristics, Emergence of Software Engineering, Software Metrics & Models, Process & Product Metrics.

Unit 2: Software Life Cycle Models: Waterfall, Prototype and Spiral Models and their Comparison.

Unit 3: Software Project Management: Size Estimation- LOC and FP Metrics, Cost Estimation- Delphi and Basic COCOMO, Introduction to Halstead's Software Science, Staffing Level Estimation- Putnam's Model.

Unit 4: Software Requirements Specification: SRS Documents, their Characteristics and Organization.

Unit 5: Software Design: Classification, Software Design Approaches, Function Oriented Software Design, Structured Analysis- Data flow Diagrams and Structured Design, Introduction to Object Oriented Design.

Unit 6: Coding and Testing of Software: Unit Testing, Block Box Testing, White Box Testing, Debugging, Program Analysis Tools, System Testing.

Unit 7: Software Reliability and Quality Assurance: Reliability Metric- Musa's Basic Model.

Unit 8: Software Quality Assurance: ISO 9000 and SEI CMM and their Comparison.

Unit 9: Software Maintenance: Maintenance Process Models and Reverse Engineering, Estimation of Maintenance Costs. Introduction to "Rational Rose".

Text Book:

1. Rajib Mall - Fundamentals of Software Engineering, Prentice Hall of India, New Delhi, 2005

Reference Book:

1. Pankaj Jalote- An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, New Delhi, 2005
2. Richard Fairley- Software Engineering Concepts, Tata McGraw Hill, New Delhi, 2006

**VISUAL PROGRAMMING
BCA-C4004**

Unit 1: Essential Visual Basic.NET: The .NET Framework and the Common Language Runtime, Building the VB.NET Applications, The Visual Basic Integrated Development Environment.

Unit 2: The Visual Basic Language: Operators, Conditionals and Loops: The Visual basic Keywords, Visual Basic Statement, All about statement syntax, The Options and Import Statements.

Unit 3: .NET Assemblies.: .NET Assemblies, Shared Assemblies, Side-By-Side execution of two versions of SharedObject, Benefits of Assemblies over Predecessors, Private Assemblies

Unit 4: Web Forms: Working with Web Forms, Working with Web Form Controls, Saving a Web Application's State, Web Forms and HTML, Creating a Web Application, Adding Controls to a Web Form, Running a Web Application, Using the HTML Editor to Customize Web Pages, Creating a Multiform Web Project, Handling a Client Events.

Unit 5: Web Forms: Buttons, Text Boxes, Labels, Literals and Place Holders: The Control Class, The Web Control Class, Creating Buttons, Creating Text Boxes, Creating Labels, Creating Literals, Creating Place Holders. Web Forms: Checkboxes, Radio Buttons, Tables and Panels: Checkboxes, Checkboxes Lists, Radio Buttons, Radio Buttons Lists, tables , Panels. HTML Controls: Client and Server HTML Controls, HTML Server Control Classes, The Html Control Class, Working with HTML Client Controls, Working with HTML Server Controls. Database Access in Web Applications.

Text Book:

1. Steven Holzner, Visual Basic.NET Programming Black Book, 5TH Ed. (2007), Dreamtech Publication.

Reference Books:

1. Dinesh Maidasani, VB.net, Firewall Media Publication, 2007.

**DATA COMMUNICATIONS AND COMPUTER NETWORKS
BCA-C4005**

Unit 1: Data Transmission Basic Concepts and Terminology: Data Communication Model, Communication Tasks, Parallel & Serial Transmission, Transmission Models, Transmission Channel, Data Rate, Bandwidth Signal Encoding Schemes, Data Compression, Transmission Impairments, Layering and Design Issues, OSI Model, Services and Standards.

Unit 2: Computer Network: Network Topology, Performance of Network, Network Classification, Advantages & Disadvantages of Network, Transmission Media (guided and unguided), Network Architecture, OSI Reference Model, TCP/IP,.

Unit 3: Data Link Layer: Need for Data Link Control, Frame Design Consideration, Flow Control & Error Control (Flow control mechanism, Error Detection and Correction techniques) Data Link Layer Protocol.

Unit 4: Network Layer: Routing, Congestion control, Internetworking principles, Internet Protocols (IPv4 packet format, Hierarchical addressing sub netting, ARP).

Unit 5: Physical Layer & Local Area Network:: Function and interface, physical layer standard, null modem, Definition of LAN, LAN topologies, Layered architecture of LAN, MAC, IEEE standard. Ethernet LAN, CSMA, CSMA/ CD, Token passing LAN.

Unit 6: Basic Applications: Telnet, FTP, NFS, SMTP, SNMP and HTTP.

Text Book:

1. Prakash C. Gupta -Data Communications & Computer Networks, PHI, New Delhi.

Reference Books:

1. William Stallings- Data & Communications, 6th Edition, Pearson Education.
2. Tanenbaum- Computer Networks, 3rd Edition, PHI, New Delhi.

COMPUTER GRAPHICS AND MULTIMEDIA LAB

BCA P4006

Experiment problems of Computer Graphics and Multimedia Lab will be from the theory classes of BCA C4001

VISUAL PROGRAMMING LAB

BCA P4007

Experiment problems of Visual Programming Lab will be from the theory classes of BCA C4004

**INTERNET CONCEPTS AND WEB DESIGN
BCA-C5001**

Unit 1: Internet Basics

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

Unit 2: Introduction to HTML

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

Unit 3: Java Script

Java Script in Web Pages, Advantages of Java Script, Advantages of Java Script, Data Types and Literals, Type Casting , Java Script Array, Operators and Expression, Conditional Checking , Function, User Defined Function.

Unit 4: Understanding XML

SGML, XML, XML and HTML, Modeling XML Data, Styling XML with XSL, XHTML

Unit 5: Creation of Dynamic Web pages using JSP

Dynamic Web Page, Introduction of JSP, Pages Overview, JSP Scripting, Standard Action, Page Directive, Include Directive

Text Books:

1. Ivan Bay Ross- Web Enable Commercial Application Using HTML, DHTML, BPB Publication
2. Michel Morrison -HTML and XML for Beginners, PHI, New Delhi- 2001
3. H.M Dietal and P.J Dietal -Java How to Program, PHI, New Delhi- 2005

Reference Book:

1. Java Server Side Programming -WROX Publication

DESIGN AND ANALYSIS OF ALGORITHM BCA-C5002

Unit 1: Introduction & Design of Efficient Algorithm

Algorithm and their Complexity, Randomized Algorithm Data Structure, Set Representation, Graphs, Trees, Recursion, Divide and Conquer, Balancing, Dynamic Programming.

Unit 2: Divide and Conquer

Generate Method, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick Sort.

Unit 3: The Greedy Method:

The General Method, Tree Vertex Splitting Job, Optimal Merge Patterns, Minimum Cost Spanning Trees.

Unit 4: Data structure for Set Manipulation Problems

Fundamental Operations on Set, Hashing Technique, Binary Search Trees, Optimal Binary Search Trees.

Unit 5: Algorithm on Graphs

Depth First Search, Biconnectivity, Depth First Search of a Directed Graph.

Text Book:

1. Horowitz E- Computer Algorithms, Galgotia Publication, New Delhi -2000

Reference Book:

1. Aho A.V, Hopcroft J.E & Ullman J.D - The Design and Analysis of Computer Algorithm, Addison Wesley, 1998.

LINUX PROGRAMMING BCA-C5003

Unit 1: INTRODUCTION

The Linux/Unix File Model, The Linux/Unix Process Model, Standard C vs. Original C, Why GNU Programs Are Better.

Unit 2: ARGUMENTS, OPTIONS, AND THE ENVIRONMENT

Option and Argument Conventions, Basic Command-Line Processing, Option Parsing: getopt () and getopt_long (), The Environment.

Unit 3: USER-LEVEL MEMORY MANAGEMENT

Linux/Unix Address Space, Memory Allocation, Library Calls: malloc (), calloc (), realloc (), free (), String Copying: strdup (), System Calls: brk () and sbrk (), Lazy Programmer Calls: alloca (), Address Space Examination.

Unit 4: FILES AND FILE I/O

Introduction the Linux/Unix I/O Model, Presenting a Basic Program Structure, Determining What Went Wrong, Doing Input and Output, Random Access: Moving Around within a File, Creating Files, Forcing Data to Disk, Setting File Length.

Unit 5: DIRECTORIES AND FILE METADATA

Considering Directory Contents, Creating and Removing Directories, Reading Directories, Obtaining Information about Files, Changing Ownership, Permission, and Modification Times.

Unit 6: FILESYSTEMS AND DIRECTORY WALKS:

Mounting and Unmounting Filesystems, Files for Filesystem Administration, Retrieving Per- Filesystem Information, Moving Around in the File Hierarchy, Signals for Interprocess Communication, Important Special-Purpose Signals, Signals Across fork () and exec ().

Unit 7: PERMISSIONS, USER AND GROUP ID NUMBERS:

Checking Permissions, Retrieving User and Group Ids, Checking As the Real User: access (), Setting Extra Permission Bits for Directories, Setting Real and Effective IDs, Working with All Three IDs: getresuid () and setresuid () (Linux).

TEXT BOOK:

1. A. Robbins- Linux Programming by Example- Pearson Education, New Delhi- 2005

REFERENCE BOOKS:

1. J.Goerzen- Linux Programming Bible, IDG Books, New Delhi- 2001
2. N.Mathew & R.Stones- Beginning Linux Programming Wiley Publishing India, 2004

COMPUTER ORIENTED NUMERICAL METHODS BCA-C5004

Unit 1: Errors in Numerical Calculations

Numbers and their accuracy, Errors and their Computations- Absolute, Relative and Percentage, General Error Formula.

Unit 2: Solution of Algebraic and Transcendental Equations

Introduction, Bisection method, Iteration method, Method of False Position, Newton-Raphson method, Graeffe's Root-Squaring method.

Unit 3: Interpolation

Introduction, Errors in Polynomial Interpolation, Finite Differences-Forward, Backward and Central, Detection of errors using Difference tables, Differences of a Polynomial, Newton's formulae for Interpolation, Central Difference Interpolation Formulae- Gauss's Central Difference Formula, Stirling's and Bessel's Formulae, Interpolation with unevenly spaced points, Lagrange's Interpolation Formula, Divided Differences and their properties- Newton's General Interpolation Formula, Inverse Interpolation.

Unit 4: Numerical Differentiation and Integration

Introduction, Numerical Differentiation and Errors, Numerical Integration – Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Weddle's Rule, Romberg Integration, Newton-Cotes Integration Formulae.

Unit 5: Numerical Solution of Linear System of Equations

Direct Methods- Matrix Inversion Method, Gauss-Jordan Method, Gauss Elimination Method, Method of Factorization, Ill-conditioned Linear System, Iterative Method- Gauss-Jacobi Method, Gauss-Seidel Method, Eigen Value Problem.

Unit 6: Numerical Solution of Ordinary Differential Equations

Solution by Taylor's Series, Euler's method, Modified Euler's method, Runge-Kutta method of 2nd and 4th order, Predictor-Corrector methods-Milne's method, Adam-Moulton method.

Text Book:

1. S.S.Sastry -Introductory methods of Numerical Analysis,4th Edition,Prentice Hall of India, New Delhi, 2006

Reference Books:

1. V.N.Vedamurthy et.al.-Numerical Methods, Vikas Publishing House, New Delhi, 2005.
2. B.S.Grewal- Numerical Methods in Engineering & Science, Khanna Publishers, Delhi,2005.

INTERNET CONCEPT AND WEB DESIGN LAB

BCA P5005

Experiment problems of Visual Programming Lab will be from the theory classes of BCA C5001

NUMERICAL METHOD LAB

BCA P5006

Experiment problems of Visual Programming Lab will be from the theory classes of BCA C5004

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OPTIMIZATION TECHNIQUES

BCA-C6001

Unit 1: Operations Research-An Introduction

Definitions of Operations Research, Characteristics of Operations Research Approach.

Unit 2: Linear Programming- Applications and Model Formulation

Introduction, Structure of Linear Programming Model, Advantages of Using Linear Programming, Limitations of Linear Programming, Applications Areas of Linear Programming, General Mathematical Model of Linear Programming Model, Guidelines on Linear Programming Model Formulation, Examples of LP Model Formulation.

Unit 3: Linear Programming- The Graphical Method

Introduction, Important Definitions, Graphical Solution Methods of LP Problem.

Unit 4: Linear Programming- The Simplex Method

Introduction, Standard Form of an LP Problem, Simplex Algorithm (Maximization Case), Simplex Algorithm (Minimization Case).

Unit 5: Transportation Problem

Introduction, Mathematical Model of Transportation Problem, The Transportation Algorithm, Methods for Finding Initial Solution.

Unit 6: Assignment Problem

Introduction, Mathematical Model of Statement Assignment Problem, Solution Methods of Assignment Problem.

Unit 7: Project Management-PERT and CPM

Introduction, Basic Differences between PERT and CPM, Phases of Project Management, PERT/CPM Network Components and Precedence Relationships, Critical Path Analysis.

Text Book:

1. J.K Sharma- Operations Research Theory & Applications, 3rd Edn, Macmillan India Ltd.,
New Delhi-2007.

Reference Book:

1. H.A. Taha-Operations Research: An Introduction, Pearson Education, New Delhi, 2006.

PRINCIPLE OF MANAGEMENT BCA-C6002

Unit 1: Nature of Management

Meaning, Definition, its nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management- Administration-Organization, Management Skills, Levels of Management.

Unit 2: Evolution of Management Thought

Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Barhard & Peter Drucker to the management thought. Business Ethics & Social Responsibility: Concept, Shift to Ethics, Tools of Ethics.

Unit 3: Functions of Management: Part-I

Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, levels – advantages & limitations. Forecasting- Need & Techniques Decision making-Types - Process of rational decision making & techniques of decision making Organizing – Elements of organizing & processes:

Types of organizations, Delegation of authority – Need, difficulties Delegation – Decentralization Staffing – Meaning & Importance Direction – Nature – Principles Communication – Types & Importance

Unit 4: Functions of Management: Part-II

Motivation – Importance – theories Leadership – Meaning –styles, qualities & function of leader Controlling - Need, Nature, importance, Process & Techniques, Total Quality Management Coordination – Need – Importance Management of Change: Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management.

Unit 5: Strategic Management

Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India

Referential Books :

1. Essential of Management – Horold Koontz and Itainz Weibrich- McGrawhills International
2. Management Theory & Practice – J.N.Chandan
3. Essential of Business Administration – K.Asawthapa, Himalaya Publishing House
4. Principles & practice of management – Dr. L.M.Parasad, Sultan Chand & Sons – New Delhi
5. Business Organization & Management – Dr. Y.K.Bhushan
6. Management: Concept and Strategies By J.S. Chandan, Vikas Publishing
7. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
8. Business organization and Management by Talloo by Tata McGraw Hill

ACCOUNTING AND FINANCIAL MANAGEMENT BCA-C6003

Unit 1: Accounting

Basic of Accounting, Accounting Mechanics- Double Entry System, Classification, Rules for Debit and Credit Concepts & Conventions, Indian Accounting Standards.

Unit 2: Journal, Ledger and Trial Balance

Meaning of Journal, Advantages, Subdivision. Meaning, subdivision, Mechanics of Posting, balancing of Ledger accounts. Defects of trial balance, Errors disclosed by trial balance, preparation and locating errors.

Unit 3: Cash Book and Subsidiary books of Accounting

Kinds of cashbook, Purchase daybook, Sales daybook, Bills receivable book, Bills payable book.

Unit 4: Finance Accounts

Trading account, Profit & Loss account, Adjustments, Balance Sheet, Forms of balance Sheet, Assets and their classification, liabilities and their classification, uses and limitations.

Unit 5: Nature of Financial Management

Scope of financial functions, finance functions and job of finance manager, organization of finance function.

Unit 6: Understanding of Financial statements & Statement of Changes of financial position

Concept of profit and loss account and balance sheet- significance of their preparation. definition of funds, fund flow statement, cash flow statement.

Text Books:

1. Management Accounting – Manmohan Singh and Goel
2. Financial management- Pandey I. M.

Reference Books:

5. Hanif & Mukherjee-Modern Accountancy, TMH, New Delhi.
6. Maheshwari & Maheshwari- An Introduction to Accountancy, Vikas Publishing House Pvt.Ltd., New Delhi.

COMPUTER NETWORK SECURITY

BCA-C6004

Unit 1: Introduction

Attack, Services and Mechanism, Model for Internetwork Security. Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.

Unit 2: Network Security

Authentication Application: Kerberos, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.

Unit 3: IP security Architecture

Overview, Authentication header, Encapsulating Security Payload combining Security Associations, Key Management.

Unit 4: Web Security

Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.

Unit 5: Network Management Security

Overview of SNMP Architecture-SMMPV11 Communication Facility, SNMPV3.

Unit 6: System Security

Intruders, Viruses and Related Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management.

Referential Books:

1. W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education, 2000.
2. W. Stallings, Cryptography and Network Security, Principles and Practice, Pearson Education, 2000.

**PROJECT
BCA-C6005**

One month industrial project

**ELECTIVE – I
E-COMMERCE
BCA-E5007**

Unit 1: Introduction to E-commerce

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

Unit 2: E-commerce business models and concepts

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

Unit 3: E-commerce infrastructure

The Internet, Technology background, The internet today, The world wide web.

Unit 4: Building an E-commerce web site

A systematic approach, choosing server software, choosing the hardware for an E-commerce site, other E-commerce site tools.

Unit 5: Security and Encryption

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

Unit 6: E-commerce payment systems

Payment systems, Credit card E-commerce transactions, E-commerce digital payment systems in the B2C arena, B2B payment systems.

Unit 7: Ethical, Social, and Political issues in E-commerce

Understanding ethical, social, and political issues in E-commerce, Privacy and information rights, Intellectual property rights, Governance, Public safety and welfare.

Text Book:

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

Reference Books:

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

ELECTIVE – I**SOFTWARE TESTING**

BCA E5008

Unit 1: Introduction: Purpose – productivity and quality in software – testing vs debugging – model for testing – bugs – types of bugs – testing and design style.

Unit 2: Flow/ Graphs and path testing – achievable paths – path instrumentation – application – transaction flow testing techniques – data flow testing strategies

Unit 3: Domain testing: Domains and paths – domain and interface testing – linguistic – metrics – structural metrics – path products and path expressions.

Unit 4: Syntax testing – formats – test cases – logic based testing – decision tables – transition testing – states, state graph, state testing.

Unit 5 :Verification and validation – fundamental tools – levels of testing – testing approaches – types of testing – test plan – software testing tools: WinRunner – Silk test.

Text Book:

1. B. Beizei, 2003, Software testing techniques, IIEdn., DreamTech India, New Delhi
2. K.V.K.K. Prasad, 2005, Software testing tools, DreamTech India, New Delhi

Reference Book:

1. I. Burnstein, 2003, Practical software testing, Springer International Edn.
2. E. Kit, 1995, Software testing in the real world: Improving the process, Pearson Education, Delhi
3. R. Rajani, and P. P. Oak, 2004, Software testing Tata Mc. Graw Hill, New Delhi

ELECTIVE – I

SOFT COMPUTING BCA E5009

Unit1: Introduction to Artificial intelligence system, Neural Network, Fuzzy Logic and Genetic Algorithm.

Fuzzy Set Theory: Fuzzy Versus Crisp, Crisp Set, Fuzzy Set, Crisp Relation, Fuzzy Relation.

Fuzzy System: Crisp logic, Predicate logic, Fuzzy logic, Fuzzy rule based system, Defuzzification Methods, Applications. Genetic algorithms, Basic concepts, creation of offspring, working principle, encoding, fitness function, reproduction.

Unit2: Genetic modeling, inheritance operations, cross over, inversion and deletion, mutation operator, Bit wise operators, Generation cycle, Convergence of genetic algorithm, applications, Multilevel optimization, real life problems, difference and similarities between GA and other traditional methods, advance in GA.

Unit3: Fundamentals of neural networks, basics concepts of neural networks, human brain model of an artificial neuron, neural network architectures, characteristics of neural networks, learning method, taxonomy of neural network architectures, History of neural networks research, early neural networks architectures, some application domains.

Text Book:

1. S. Rajashekharan and G. A. Vijayalaxmi-“Neural Network, Fuzzylogic and genetic algorithm synthesis and applications”, Prentice Hall of India PLT, Pai-2004

Reference Book:

1. Jyh – shing R Jang, C.T. Sun, E. Mizutani – Neuro Fuzzy and Soft Computing – A computational approach to learning and machine intelligence. Prentice Hall of India – 1997

ELECTIVE – II

MANAGEMENT INFORMATION SYSTEM

BCA-E6006

Unit 1: Introduction to MIS

The Technical and Business Perspective, Organization Structure, Evaluation of MIS through Information System, MIS Organization within the Company.

Unit 2: Information Systems for Decision Making

Evolution of an Information System, Basic Information Systems, Decision Making and MIS, Decision Assisting Information System, Concepts of Balanced MIS Effectiveness and Efficiency Criteria.

Unit 3: Development of MIS

Methodology and Tools/Techniques for Systematic Identification, Evaluation and Modification of MIS.

Unit 4: Advanced MIS

Concepts, Needs and Problems in Achieving Advanced MIS, DSS.

Unit 5: Pitfalls in MIS Development

Fundamental Weakness, Soft Spots in Planning and Design Problems.

Text Book:

Murdic, Rose and Clagett- Information Systems for Modern Management, PHI, New Delhi.

Reference Book:

Laudon-Laudon- Management Information Systems, Pearson Education, New Delhi.

ELECTIVE – II**ARTIFICIAL INTELLIGENCE**

BCA E6007

Unit1: Overview Of Artificial Intelligence- Problems Of AI, AI Technique, Tic -Tac - Toe Problem.

Unit2: Agents & Environment, Nature Of Environment, Structure Of Agents, Goal Based Agents, Utility Based Agents, Learning Agents.

Unit3 : Problems, Problem Space & Search: Defining The Problem As State Space Search, Production System, Problem Characteristics, Issues In The Design Of Search Programs.

Unit4: Solving Problems By Searching, Problem Solving Agents, Searching For Solutions; Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bidirectional Search, Comparing Uniform Search Strategies.

Unit5: Solving Problems By Searching :Problem Solving Agents, Searching For Solutions; Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Bidirectional Search, Comparing Uniform Search Strategies.

Unit6: Greedy Best-First Search, A* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search, Simulated Annealing Search, Local Beam Search, Genetic Algorithms; Constraint Satisfaction Problems, Local Search For Constraint Satisfaction Problems.

Text Book:

1. Ritch & Knight -Artificial Intelligence, TMH

Reference Books:

1. S. Russel and P. Norvig- Artificial Intelligence A Modern Approach, Pearson Education.
2. Patterson -Introduction to Artificial Intelligence & Expert Systems, PHI

ELECTIVE – II

BIO-INFORMATICS

BCA E6008

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

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

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

Unit IV :Sequence Alignments and Visualization.Introduction to Sequences, alignments and Dynamic Programming;Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm).

Text Books:

1. Bioinformatics for Geneticists
Author(s): Michael Barnes, Ian C Gray

Reference Books:

1. Bioinformatics Computing
Author(s): Bryan P. Bergeron