

BHARATI VIDYAPEETH UNIVERSITY

SYLLABI FOR THREE YEAR INTEGRATED BACHELOR OF SCIENCE (COMPUTER SCIENCE)DEGREE COURSE B.Sc. (Computer Science)

**THE B.Sc. (COMPUTER SCIENCE) DEGREE COURSE WILL BE OF THREE
YEARS DURATION.**

The B.Sc.(Computer Science) Degree Course is of three years duration divided into six semesters.The structure of the course and syllabus of the first year will come into effect from the academic year 2010-2011.The second and third year syllabus will be implemented from 2011-2012 and 2012-2013 respectively.

RULES & REGULATIONS FOR B.Sc (COMPUTER SCIENCE) COURSE

ELIGIBILITY FOR ADMISSION TO B.Sc(COMPUTER SCIENCE) COURSE :

- i. A candidate who has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board or Higher Secondary Examination of its equivalent of any other statutory Board or University and has passed in English and in two Science subjects (i) Physics (ii) Mathematics shall be eligible for admission to the First year B.Sc (Computer Science) Degree course.

- ii. Candidate who has passed H.S.C. examination (10+2) with English ,Physics, Mathematics and any one of the following vocational subjects is also eligible for admission to the F.Y.B.Sc. (Computer Science) course.

Subject code	Subject
97	Information Technology
D9	Computer Science

Structure of B.Sc.(Computer Science) Degree Programme

Course	Paper No.	Title	Marks
<u>F.Y.B.Sc.</u> (Comp. Sc.)		SEMESTER I	
	CS-11	English Online Communication for Information Technology – I	50
	CS -12	Elementary Algorithmics	50
	CS -13	Introduction to Structured Programming and Programming in C - I	50
	CS -14	Mathematical Foundation of Computer Science-I	50
	CS -15	Combinatorics and Algorithmic Graph Theory -I	50
	CS -16	Linear Electronics - I	50
	CS-17	Digital Electronics -I	50
	CS -18	Computer Oriented Statistical Techniques -I	50
<u>F.Y.B.Sc.</u> (Comp. Sc.)		SEMESTER II	
	CS -21	English Online Communication for Information Technology – II	50
	CS -22	Operating Environments	50
	CS -23	Structured Programming and Programming in C - II.	50
	CS -24	Mathematical Foundations of Computer Science -II	50
	CS -25	Combinatorics and Algorithmic Graph Theory - II	50
	CS -26	Linear Electronics - II	50
	CS -27	Digital Electronics - II	50
	CS -28	Computer Oriented Statistical Techniques - II	50
		LAB COURSE	
	CS- I	Lab Course on MS-OFFICE.	100

Course	Paper No.	Title	Marks
	CS- II	Lab Course on C.	100
	CS- III	Lab Course on Electronics.	100
<u>S.Y.B.Sc.</u> (Comp. Sc.)		SEMESTER III	
	CS -31	Programming in C++	50
	CS -32	VB.Net - I	50
	CS -33	Optimization Techniques - I	50
	CS -34	Computational Geometry - I	50
	CS -35	Microprocessors	50
	CS -36	Principles of Communication .	50
<u>S.Y.B.Sc.</u> (Comp. Sc.)		SEMESTER IV	
	CS -41	Data Structures with C++.	50
	CS -42	VB.Net - II	50
	CS -43	Computer Oriented Numerical Methods Principles	50
	CS -44	Computer Graphics	50
	CS -45	8051 Microcontroller	50
	CS -46	Digital Signal Processing	50
		LAB COURSE	
	CS- IV	Lab Course on C++ and Data Structures	100
	CS- V	Lab Course on VB.Net	100
	CS- VI	Lab Course on Electronics	100

Course	Paper No.	Title	Marks
<u>T.Y.B.Sc.</u> (Comp. Sc.)		SEMESTER V	
	CS -51	Operating System	50
	CS -52	Web Supporting Technologies	50
	CS -53	Data Communication and Networking	50
	CS -54	Database Management Systems	50
	CS -55	Software Engineering	50
	CS -56	Theoretical Computer Science	50
<u>T.Y.B.Sc.</u> (Comp. Sc.)		SEMESTER VI	
	CS -61	Linux Programming	50
	CS -62	Core JAVA	50
	CS -63	Open Source Technologies	50
	CS -64	Database Management with Oracle	50
	CS -65	UML and Object Oriented Design	50
	CS -66	Compiler Construction	50
		LAB COURSE	
	CS- VII	Lab Course on Linux	100
	CS- VIII	Lab Course on web supporting Technologies and Java	100
	CS- IX	Lab Course on Oracle and Software Project	100

CHANGE OF COURSE

As all the heads of the course are compulsory change of course is not allowed.

EXAMINATION

- 1) A candidate shall not be admitted to the annual examination of the First Year, Second Year and Third Year, unless he/she has satisfactorily kept two terms for the courses at the college of this University.
- 2) An application (which must be in the prescribed form and accompanied by the prescribed fee) for admission to any of the examination of B.Sc(Computer Science) Degree Course shall be submitted by a candidate to the Registrar through the Principal of the college attended by him/her on or before the prescribed date along with a certificate from the Principal. (i) of his/her having attended the course and kept the terms in the various subjects and of having satisfied the other conditions laid down by the University and (ii) of his/her being fit candidate for the examination.
- 3) A candidate shall not be admitted to the First year of B.Sc (Computer Science) examination for the first time unless he/she produces a certificate from the Principal to the effect that he/she has attended at least 3/4th of the aggregate number of periods for Physical Training or has been exempted there from on the ground that (a) he/she is medically unfit to undergo such training (b)he/she is a member of the N.C.C. or (c) he/she has been regularly taking part as a member of the college team in the recognized tournaments of the major games.
- 4) **Internal Assessment**
An internal evaluation would be done at the end of each semester . This internal evaluation will be of 10 marks in each subject (Theory) conducted by the college as per University Guidelines.
- 5) **Annual Examination**
 - i) **Theory**
An Annual Examination will be held at the end of the each semester. The Annual Examination of each subject will be of 40 marks and will be of two hours duration.
 - ii) **Practical**
 - a) There shall be Annual Practical Examinations for First and Second year B.Sc (Computer Science) for two papers of Computer Science and one paper of Electronics each of 50 marks.

- b) There shall be Annual Practical Examination for Third Year B.Sc (Computer Science) Course for three papers of Computer Science each of 100 marks.

6) Rules regarding ATKT to S.Y/T.Y.B.SC (COMPUTER SCIENCE)

a) **S.Y.B.Sc (Computer Science)**

A student will be allowed to keep terms at S.Y.B.Sc (Computer Science) level if he/she fails in not more than six heads of passing in courses at F.Y. B.Sc (Computer Science) level.

b) **T.Y.B.Sc (Computer Science)**

A student will be allowed to keep terms at T.Y.B.Sc (Computer Science) level,

i) If he/she fails in not more than five heads of passing in courses at S.Y.B.Sc (Computer Science) level.

ii) If he/she clears in all heads of passing at F.Y.B.SC. (Computer Science) level.

7) Standard of Passing

a) The candidate who has secured 20 marks out of 50 shall be declared to have passed in the paper however he/she should score 16 marks out of 40 in the theory.

b) The University shall conduct the 'Supplementary Annual Examination' and in October/November for the repeater students.

8) Award of Class

A Class should be awarded to the students of B.Sc (Computer Science) Degree on the aggregate marks in the Second Year and Third Examination. The award of class shall be as follows -

9) Class Improvement:

The rules regarding the improvement of the class of B.Sc. course will be as follows, as notified by Bharati Vidyapeeth University:

1. The candidate who has passed UG and PG degree examinations of this university with class as shown in column no. 1 and who desires to improve the class as shown in column no. 2 below will be permitted at his/her option to appear for the same examination without being required to keep any terms.

Column no. 1	Column no. 2
Pass Class or Second Class or Higher Second Class or First Class as the case may be	Second Class or Higher Second Class or First Class or First Class with Distinction as the case may be

2. For improvement of class, the candidate will be required to apply and allowed to appear only for the theory examinations.
3. A candidate shall have to reappear for minimum 1/3 and/or maximum of all the theory papers at a time, on which the class is awarded. Candidate should ensure that the examination time table for the subject he is appearing will not clash.
4. Performance of the candidates reappearing for the subject less than 1/3 of the total theory examinations mentioned above will not be considered. However, his/her appearance will be counted as an attempt.
5. If the candidate, who has reappeared for the final year examination under the provisions for his/her class, is successful in improving his/her class by such reappearance, he/she will have to surrender to the university the original degree and the statement of marks that he/she had obtained in that course/subject. Unless original degree and the statement of marks are returned to the university by the candidate, the new degree certificate and statement of marks cannot be issued to the candidate. In the revised degree certificate/statement of marks to be given to the candidate a mention will be made of the fact that he/she improved his/her class under class improvement attempt.
6. A candidate appearing for the improvement of the class/grade shall not be entitled to get benefit of any other rules/orders of the university regarding condonation /grace marks.
7. A candidate appearing for the improvement of class/grade shall not be entitled to get any prize/medal/scholarship/award etc.
8. A candidate who has reappeared for the above examination/s under the provision fails to improve his/her class/grade, his/her performance at such reappearance at such reappearance shall be ignored.
9. If the candidate makes no improvement in the class, then earlier performance will be retained.
10. A candidate will be allowed to reappear for the examination for improvement of class/grade within a period of three years from the date of his/her passing the degree examination.
11. The candidate will be given maximum of three attempts for the improvement of his/her class.
12. The candidate who desires to apply for improvement of class should submit his/her application form for improvement of class from the College/School of Distance Education, Study Centre through which he/she has undergone the course. Form should be submitted for improvement before 31st August for the October/November examination and 28th February for April/May examination season. No form for improvement of class shall be accepted after the prescribe dates for the respective/corresponding examination season.
13. Revised mark-sheet will be issued with remark '**Under improvement attempt**'.

- | | |
|--|--------------------------------|
| a) Aggregate 70% and above | - First Class with Distinction |
| b) Aggregate 60% and above but less than 70% | - First Class |
| c) Aggregate 55% and more but less than 60% | - Higher Second Class |
| d) Aggregate % and more but less than 55% | - Second Class |
| e) Aggregate 40% and more but less than % | - Pass Class |
| f) Below 40% | - Fail |

University Terms

The dates for the commencement and conclusion of the First and the Second terms shall be fixed by the University authorities. The Terms can be kept by students, who have registered their names with the University.

F.Y.B.Sc. (ENGLISH)

SEMESTER –I

CS-11 : English Online Communication for Information Technology – I

A. Objectives:

- i. To encourage and enable the students to read the various types of texts on their own and discuss them among peers.
- ii. To develop competence among the students for self-learning.
- iii. To develop their communicative skills and their proficiency in English language.
- iv. To make students aware of the different communicative skills.
- v. To prepare them to function effectively in their future professions.

B. Course Content:

45 Lectures

Text: English Online: Communication for Information Technology by Mohanraj, Jayashree & Mohanraj, S., (Orient Longman)

1. Once a Wonder, Now a Curiosity
2. The Birth of Internet
3. The Y2K Bug
4. Cutting Across Boundaries

(The above units will include Vocabulary, Study Skills, Grammar, Usage & Writing as indicated in the text)

C. The books recommended:

1. Chettur G. K.: English Grammar, Composition and Essay
2. M.L. Tickoo: A Remedial Grammar, Usage and Grammar (Orient Longman, 1976)
3. Thomson A.J. & Martinet A.V.: Practical English Grammar (Oxford University Press, 1986).
4. Tickoo C. & Shashikumar J.: Writing With Purpose (Oxford University Press, 1979).F.T. Wood. : A Remedial English Grammar for Foreign Students (Macmillan).

F.Y.B.Sc. (COMPUTER)

SEMESTER –I

CS- 12 : ELEMENTARY ALGORITHMICS

Course content

45 Lectures

1. Concepts of Problem, Procedure and Algorithm, Algorithm Representation through Pseudo-Code and Flow-Charts Tracing of Algorithms. Concept of a program and structure of procedure oriented languages.
2. Problem Analysis and Design of Algorithms for problems such as (1) Swapping (2) Counting (3) Finding the Sum, Product, maximum, minimum of a list of numbers, and (4) Simple variations of the above problems realization that there may be alternative algorithm and that one algorithm may be better (in some sense) than the other.
3. Problem Analysis and Design of Algorithms for problems such as (1) Evaluation of a polynomial (2) Sum of first n factorials (3) Finding the n^{th} term of a Fibonacci sequence, (4) Finding the largest and second largest of a list, (5) Evaluating finite series and variations of these problems, (6) Determining n^{th} root of a number
4. Introduction to recursive algorithms and their tracing. Applications to (1) Computation of a factorial, sum, maximum, Fibonacci terms . (2) Base conversion (3) Reversing a String and checking for palindrome property. (4) To compute GCD .
5. Concept of array and problems that involve array manipulation (1) Removing the duplicates (2) Partitioning of an array, (3) Listing of prime numbers (4) Finding the prime factor of a number (5) Printing a Histogram.
6. The problem of search and merge, Linear, Binary search algorithms. The problem of Sorting, Selection, Insertion, Bubble, Quick, and Merge Sort algorithms.

Reference Books :

1. How to solve it by a computer by Dromey R.G.
2. Data Structures, Algorithms and applications in C++ (Ch I I) by Sartaj Sahni

F.Y.B.Sc. (COMPUTER)

SEMESTER –I

CS-13 : Introduction to Structured Programming and Programming in C - I

Course content

45 Lectures

1. Introduction, Concept, Basic Control structures (Sequence, Selection, Repetition Multiple Selection etc.)
2. Benefits of structured programming, Reading by stepwise Abstraction, Program verification and writing, Documentation
- 3 Introduction to C language**
Scope, features, objectives and application areas.
- 4. C fundamentals**
Variables, operators, expressions, control structures
- 5. Functions**
Block, Arguments, Recursion, storage classes and its scope rules.

Reference of books

- Programming in C by S . Kohan
- Born to code in C by H Schildt
- The art of C by H Schildt
- C programming by Kerningham & Richie – 2 nd edition
- Let us C by Yashwant Kanetkar
- C programming by E- Balaguruswami

F.Y.B.Sc. (MATHEMATICS)

SEMESTER-I

CS-14 : MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Course content

45 Lectures

[1] Relations and Functions

- (1.1) Ordered Pairs, Product Sets
- (1.2) Relations, Types of relations, Partial Ordering
- (1.3) Equivalence Relation, Equivalence Classes, Properties of Equivalence Classes, Partition of set
- (1.4) Composition of Relations, Matrix Representation and Digraph of Relations
- (1.5) Transitive Closure, Warshall's Algorithm
- (1.6) Congruence Relation and its properties
- (1.7) Fermat's theorem (without proof) and its examples.
- (1.8) Definition of Function, Injective, Surjective and Inverse Functions
- (1.9) Mathematical, Exponential and Logarithmic Functions
- (1.10) Composition of two Functions

[2] Boolean Algebra

- (2.1) Partial Ordering Relations, Hasse Diagram
- (2.2) Lattices, Types of Lattices, Properties of Lattices
- (2.3) Boolean Algebras as Lattices
- (2.4) Principle of Duality, Atoms of Boolean Algebra
- (2.5) Finite Boolean Algebras
- (2.6) Boolean Expressions and Boolean Functions, Normal Form

[3] Finite Induction and Counting and Divisibility of Integers

- (3.1) First Principle of Finite Induction
- (3.2) Counting Principles, Principle of Inclusion-Exclusion
- (3.3) Functions and Counting
- (3.4) Infinite Sets and Countability
- (3.5) Combinatorial Arguments
- (3.6) Well-Ordering Principle (Statement Only)
- (3.7) Divisibility and its Properties, Prime Number
- (3.8) Division Algorithm (without proof)
- (3.9) Greatest Common Divisor (GCD), Euclidean Algorithm (without Proof)
- (3.10) Relatively Prime Integers, Euclid's Lemma and its corollary, UFD (without proof), Properties of GCD, Least Common Multiple(LCM)

[4] Vectors and Matrices

- (4.1) Vectors, Norm of vectors
- (4.2) Matrices, Types of Matrices
- (4.3) Matrix Addition & Scalar Multiplication
- (4.4) Matrix Multiplication
- (4.5) Transpose, Square Matrices, Invertible Matrices, Inverses, Rank of Matrix
- (4.6) Determinants, Solution of Linear Equations by Matrix Method
- (4.7) Elementary Row Operations, Gaussian Elimination
- (4.8) Eigenvalues and Eigenvectors
- (4.9) Quadratic Forms and their Reductions
- (4.10) Boolean (Zero-One) Matrices

Text Books:

- 1) Prof. Mrs. M.D. Bhopatkar, Prof. C.S. Nimkar, Prof. Mrs. S. Joglekar; Algebra; Vision Publications, 1998
- 2) Prof. Mrs. M.D. Bhopatkar, Prof. C.S. Nimkar, Prof. Mrs. S. Joglekar; Discrete Mathematics; Vision Publications, 1998
- 3) S.R. Patil, R.S. Bhamare, M.D. Bhagat, D.M. Pandhare; Algebra; Nirali Prakashan, 1998
- 4) S.R. Patil, R.S. Bhamare, M.D. Bhagat, D.M. Pandhare; Discrete Mathematics ; Nirali Prakashan, 1998

Reference Books:

- 1) Seymour Lipschutz and Marc LarsLipson; Discrete Mathematics (Second Edition); Tata McGRAW-HILL, Schaum's Outlines edition,1999.
- 2) C.L.Liu ; elements of Discrete Mathematics(second edition); McGRAW-HILL, International Edition ,1985
- 3) Alan Doerr ,Kenneth Lefvasseur; Applied Discrete Structures for Computer Science; Galgotia Publications Pvt. Ltd, New Delhi; 1997
- 4) Olympia Nicodemi; Discrete Mathematics ; CBS Publishers&Distributors,Delhi, 1989
- 5) Bernard Kolman, Robert C. Busby,Sharon Ross; Discrete Mathematical Structures; Third Edition, Prentice Hall of Pvt. Ltd, New Delhi-1997.
- 6) I.N. Herstein; Topics in algebra(Second Edition); Wiley Eastern Ltd. New Delhi-
- 7) A.R. Vasishtha; Modern Algebra; Krishna Prakashan Mandir Meerut,
- 8) H.S. Hall and S.R. Knight; Higher Algebra; H.M. Publications, 1994
- 9) Vijay Khanna and S.K. Bhambri; Introduction to Abstract Algebra
- 10) Shanti Narayan, Sat Pal ; A Text Book Of Modern Abstract Algebra; S. Chand & Comp. And Ltd , 1985.

F.Y.B.Sc. (MATHEMATICS)

SEMESTER-I

CS-15 : COMBINATORICS AND ALGORITHMIC GRAPH THEORY - I

Course content

45 Lectures

[1] Coding Theory, Automata Theory and Languages, Group Codes

- (1.1) Coding of binary information and error detection
- (1.2) Decoding and error correction
- (1.3) Finite state machines
- (1.4) Semigroups, machines and languages
- (1.5) Machines, simplification of machines
- (1.6) Linear codes, parity check
- (1.7) Generator matrix, examples of coset leader
- (1.8) Group code
- (1.9) Cryptosystem (Introduction),
- (1.10) Public key cryptosystem (RSA)

[2] Logic

- (2.1) Propositions, Logical Connectives, Propositional form, Truth Tables, Tautology, Contradiction, Logical Equivalence
- (2.2) Valid Arguments, Methods of proof
- (2.3) Normal Forms
- (2.4) Predicates and Quantifiers

[3] Complex Numbers

- (3.1) Revision: Addition, Subtraction, Multiplication, Conjugate, Division
- (3.2) Modulus and Argument of Complex number, Geometric Representation
- (3.3) Polar form and its properties
- (3.4) De Moivre's theorem and its applications
- (3.5) Solution of equations by using De Moivre's theorem

[4] Recurrence Relations

- (4.1) Introduction, Formation
- (4.2) Linear recurrence relation with constant coefficients
- (4.3) Homogeneous recurrence relation
- (4.4) Non Homogeneous recurrence relation & total solutions

Text Books:

- 1) Prof . Mrs.M.D. Bhopatkar, Prof. C.S.Nimkar, Prof .Mrs. S.Joglekar;
Discrete Mathematics; Vision Publications, 1998
- 2) Prof .Mrs. M.D.Bhopatkar, Prof. C.S.Nimkar, Prof .Mrs. S.Joglekar;
Algebra; Vision Publications,1998
- 3) S.R. Patil, R.S.Bhamare, M.D.Bhagat, D.M.Pandhare;
Discrete Mathematics; Nirali Prakashan, 1998
- 4) S.R. Patil, R.S.Bhamare, M.D.Bhagat, D.M.Pandhare;
Algebra; Nirali Prakashan, 1998

Reference Books:

- 1) Seymour Lipschutz, Marc Lipson; Discrete Mathematics (Second edition);
Schaum's Outlines, Tata McGraw-Hill Edition, 1999.
- 2) C.L.Liu; Elements of Discrete Mathematics(Second edition);
McGraw-Hill International editions New York, 1977
- 3) Alan Doerr, Kenneth Levasseur; Applied Discrete Structures for computer Science;
Galgotia Publications Pvt.Ltd, New Delhi,1997.
- 4) Olympia Nicodemi; Discrete Mathematics; C.B.S. Publishers & Distributors,
Delhi 1989
- 5) Bernard Kolman, Robert C. Busby, Sharon Ross, (3rd edition);
Prentice Hall of India Pvt Ltd, New Delhi, 1997
- 6) Norman L. Biggs; Discrete Mathematics, Revised Edition,
Oxford Science Publications,1985.
- 7) J.P. Tremblay and R. Manohar; Discrete Mathematical structures with applications
to computer science; Tata McGraw –Hill Edition, 1975
- 8) Narsingh Deo; Graph theory with Applications to Engineering & Computer Science,
Prentice-Hall of India, New Delhi, 1987
- 9) K.D.Joshi; Foundations of Discrete Mathematics; New age International Ltd.1996.
- 10) V.Krishnamurthi; Combinatorics; East-West Press,1985.
- 11) Alan Tucker; Applied Combinatorics; John Wiley and Sons, New York, 1980
- 12) Dr. (Mrs) N.S. Bhave, Dr.T.T. Raghunathan; Elements of Graph Theory;
Gaaj Prakashan, 1990.
- 13) Raghunathan, Nimkar, Solapurkar; A first step Graph theory

F.Y.B.Sc. (ELECTRONICS)
SEMESTER I

CS-16 :LINEAR ELECTRONICS - I

Course content

45 Lectures

1.Introduction to components

Resistors

Capacitors

Inductors and Transformers

Charging and discharging of capacitors

Growth and decay of current in L-R circuits

Growth and decay of voltage in C-R circuits

Simple numerical on the above

2.Network theorems (only statement and problems applied to DC

Revision of Ohm's law & Kirchoff's laws

Thevenin's theorem

Norton's theorem

Maximum power transfer theorem

Superposition theorem

3.Bipolar Junction Transistor

BJT classification

BJT as an amplifier

Potential divider bias for CE amplifiers,Q-point

DC load line for a CE amplifier

Simple numerical problems on biasing and DC load line.

4. Amplifier

Concept and definition of an amplifier, classification based on frequency and operating point ,single stage RC coupled CE amplifier. Study of voltage, current gain ,power gain, frequency response, I/O impedance.

5.JFET and MOSFET

Working Principle of JFET and MOSFET

I/V Characteristics

Parameters

Application of JFET as a switch and as an amplifier.

Numerical problems.

Principle of working of UJT and SCR

Application of UJT as relaxation Oscillator.

REFERENCE BOOKS

1. Basic electronics by B. L. Theraja
2. Electronics principles by Malvino.
3. Integrated circuits by Milliman.

F.Y.B.Sc. (ELECTRONICS)

SEMESTER I

CS- 17 : DIGITAL ELECTRONICS -I

Course content

45 Lectures

1.Number Systems And conversions

Binary, Octal , Decimal, Hexadecimal number systems.

Inter conversions of number systems.

BCD, Gray codes and Hamming codes.

Error detection and correcting codes

Excess three code ,One's and Two's compliment method

Examples.

2.Logic gates And their Applications

Introduction to different gates.

Boolean algebra and a few identities

De-morgan's 1st and 2nd theorem.

Interconversion of gates.

Half and full adders

Adder Subtractors

Parity checkers

3.Karnaugh maps

Introduction to Karnaugh's map.

Concept of fundamental product.

SOP,POS Method.

Formation of Pair,Quad and Octet.

Significance of Karnaugh Map.

Simplification of 2,3 and 4 variables using K-Map

4. Multiplexers And Demultiplexers ,Encoder Decoder.

Introduction to multiplexers and Demultiplexers

2:1,Mux 4:1Mux, 8:1 Mux

Multiplexer Tree.

1:2Demux,1:4Demux,1:8Demux

Introduction to Encoders and decoders.

Decimal to BCD encoder

BCD to 7 Segment Decoder.

Study of IC 74147 and IC74138.

REFERENCE BOOKS:

1. Digital principles by Malvino and Leach
2. Modern digital electronics R. P. Jain

F.Y.B.Sc. (STATISTICS)

SEMESTER I

CS - 18 : COMPUTER ORIENTED STATISTICAL TECHNIQUES –I

Course content

45 Lectures

1. Introduction

- 1.1 Definitions : Webster's and Secrist's definition of Statistics
- 1.2 Importance of statistics
- 1.3 Scope of statistics : Industry, Government, Computer science, social science, etc

2 Data condensation and graphical methods

- 2.1 Raw data, attributes and variables, discrete and continuous variables
- 2.2 General principles of classification of raw data
- 2.3 Construction of frequency distribution and cumulative frequency distribution, relative frequency distribution.
- 2.4 Graphical representation of frequency distribution : histogram, frequency polygon, frequency curve, ogive curve
- 2.5 Diagrammatic representation : simple bar, subdivided bar, pie diagram, use of MS-excel/ spreadsheet for demonstrating these diagram
- 2.6 Numerical problems

3 Measurement of central tendency

- 3.1 Concept of central tendency
- 3.2 Criteria for good measures of central tendency
- 3.3 Arithmetic mean : definition for ungrouped and grouped data, combined mean, merits and demerits
- 3.4 Median: definition, formula for computation for ungrouped and grouped data, graphical methods, merits and demerits
- 3.5 Mode: definition, formula for computation for ungrouped and grouped data, merits and demerits
- 3.6 Use of appropriate average
- 3.7 Quartiles: definition, formulae for grouped data
- 3.8 Numerical problems

4 Measures of dispersion

- 4.1 Concept of dispersion and measures of dispersion
- 4.2 Absolute and relative measure of dispersion
- 4.3 Range : definition for ungrouped data, merits and demerits
- 4.4 Variance : definition for ungrouped and grouped data, combined variance for two groups, merits and demerits
- 4.5 Standard deviation : definition for ungrouped and grouped data,

coefficient of variation
4.6 Numerical problems

5 Moments

- 5.1 Raw and central moments : definition, for ungrouped and grouped data (only up to first 4 moments)
- 5.2 Relation between central and raw moments
- 5.3 Numerical problems

6 Measures of skewness and kurtosis

- 6.1 Idea of symmetric frequency distribution, skewness of a frequency distribution, positive and negative skewness, empirical relation between mean, median and mode
- 6.2 Pearson's and Bowley's coefficients of skewness
- 6.3 Idea of kurtosis for a frequency distribution
- 6.4 Measures of skewness and kurtosis based on moments
- 6.5 Numerical problems

7 Correlation (for ungrouped data)

- 7.1 Bivariate data : scatter diagram
- 7.2 Concept of correlation, positive correlation, negative correlation
- 7.3 Karl Pearson's coefficient of correlation (r)
- 7.4 Limits of r, $-1 \leq r \leq 1$, and interpretation of r
- 7.5 Numerical problems

8 Regression (for ungrouped data)

- 8.1 Concept of regression, cause and effect relation
- 8.2 Properties of regression coefficient : $b_{xy} b_{yx} = r^2$, $b_{xy} b_{yx} \leq 1$,
 $b_{xy} = r\sigma_x/\sigma_y$, and $b_{yx} = r\sigma_y/\sigma_x$
- 8.3 Numerical problems

Books Recommended

- 1) Hogg R. V. and Craig, R. G.
Introduction to Mathematical Statistics.
- 2) Hoel. P. G.
Introduction to Mathematical Statistics.
- 3) Feller. W
Introduction to probability Theory and it's Applications. Vol –I
- 4) Mood A. M., Grabill, F. A. Boes D. C.
Introduction to Theory of Statistics.
- 5) Meyer P. L.
Introduction to Probability and Statistical Applications.
- 6) Goon, Gupta and Das Gupta
Fundamentals of Statistics Vol I & II
- 7) S. P. Gupta
Statistical methods.

F.Y.B.SC. (ENGLISH)

SEMESTER II

CS – 21 : ENGLISH ONLINE COMMUNICATION FOR INFORMATION TECHNOLOGY – II

Course content

45 Lectures

A. Objectives:

- i. To encourage and enable the students to read the various types of texts on their own and discuss them among peers.
- ii. To develop competence among the students for self-learning.
- iii. To develop their communicative skills and their proficiency in English language.
- iv. To make students aware of the different communicative skills.
- v. To prepare them to function effectively in their future professions.

B. Course Content:

Text: English Online: Communication for Information Technology by Mohanraj, Jayashree & Mohanraj, S., (Orient Longman)

1. Exercises to Stay Online
2. Web Doctors
3. Innovation on the Internet
4. The Seventh Continent
5. Presentation Skills

(The above units will include Vocabulary, Study Skills, Grammar, Usage & Writing as indicated in the text)

C. The books recommended:

1. Chettur G. K.: English Grammar, Composition and Essay

2. M.L. Tickoo: A Remedial Grammar, Usage and Grammar (Orient Longman, 1976)
3. Thomson A.J. & Martinet A.V.: Practical English Grammar (Oxford University Press, 1986).
4. Tickoo C. & Shashikumar J.: Writing With Purpose (Oxford University Press, 1979).F.T. Wood. : A Remedial English Grammar for Foreign Students (Macmillan).

F.Y.B.Sc. (COMPUTER)

SEMESTER-II

CS-22 : OPERATING ENVIRONMENT

Course content

45 Lectures

1. Computer definition, uses, block diagram, functions of ALU, input/output, scanner, plotter, keyboard, mouse, MICR, bar decoder, OCR, joystick, monitor, printer, memory unit and CPU.
2. Software-types, compilers, interpreter, assembler, linker, loader, high level and low-level languages. Files-types and operations, indexed, sequential and hashed organization. Sorting, merging, indexing and updating functions, concept of a file allocation table.
3. Operating System-types-timesharing, batch processing, multiprogramming, real-time; functions of operating systems – Introduction to file management, detailed study of DOS and Windows.
4. Networking - Data communication concepts, classification, communication media, LAN, Wan, Man, Internet, Intranet, Extranet , and their efficient use.
5. Study of office 2000(MS-Word, MS-Power Point, MS-Excel)

Reference Books :

1. A First course in computers by Ravi Saxena
2. Computer Fundamentals :Milind Oak
3. Computer Fundamentals : P.K.Sinha

F.Y.B.SC. (COMPUTER)

SEMESTER II

CS-23 : PROGRAMMING IN C

Course content

45 Lectures

1. Arrays

Declaration, entering data into an array, reading data from an array, arrays and functions, character strings.

2. Pointers

Introduction to pointers, pointers and arrays, pointers to functions

3. Structures and Unions

Declaration, Arrays of structures, Pointers to structures, structures within structures, union.

4. Input – Output

Standard input-output, formatted input-output, File handling

Reference of books

- Programming in C by S . Kohan
- Born to code in C by H Schildt
- The art of C by H Schildt
- C programming by Kerningham & Richie – 2 nd edition
- Let us C by Yashwant Kanetkar
- C programming by E- Balaguruswami

F.Y.B.Sc.(MATHEMATICS)

SEMESTER II

CS -24 : MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE -II

Course content

45 Lectures

[1] Groups

- (1.1) Binary Operations, Semigroups, Monoids, Groups: Definitions and Examples, Simple Properties
- (1.2) Abelian Group, Finite Group, Infinite Group
- (1.3) Order of an element of a Group
- (1.4) Subgroups: Definition, Necessary and Sufficient Conditions, Examples on finding subgroups of finite groups, Union and Intersection of Subgroups
- (1.5) Cyclic Subgroups: Definition, Simple Properties.
- (1.6) Coset : Definition & Simple Properties.
- (1.7) Lagrange's theorem (with proof) & its Corollaries .
- (1.8) Permutation Groups :Definition of S_n and detail discussion of the group S_3 , Cycles and Transpositions, Even and Odd Permutations, Order of Permutation, Properties :
 - a) $|S_n| = n!$ b) A_n is subgroup of S_n .

[2] Normal Subgroups, Homomorphism & Isomorphism

- (2.1) Normal Subgroups: Definition, properties with examples
 - a) If G is abelian group then every subgroup of G is normal.
 - b) H is normal subgroup of G iff $xhx^{-1} \in H$,
 - c) H is normal subgroup of G iff every left coset of H in G is also a right coset of H in G . (all with proof).
 - d) H is normal subgroup of G iff product of two right coset of H in G is also a right coset of H in G .
 - e) If H is subgroup of index 2 in G then H is normal subgroup of G .
 - f) If H is the only subgroup in G of a fixed finite order then H is normal subgroup of G . (all without proof.).
- (2.2) Quotient Groups: Definition and Examples
- (2.3) Homomorphism and Isomorphism: Definitions, Examples, Simple properties.

[3] Rings & Fields

- (3.1) Rings , Integral Domains: Definitions ,Some results (without proof),Examples.
- (3.2) Fields , Skew Field: Definitions ,Some results (without proof),Examples.

Text Books:

- 1) Prof. Mrs. M.D. Bhopatkar, Prof. C.S. Nimkar, Prof. Mrs. S. Joglekar;
Algebra; Vision Publications, 1998
- 2) Prof. Mrs. M.D. Bhopatkar, Prof. C.S. Nimkar, Prof. Mrs. S. Joglekar;
Discrete Mathematics; Vision Publications, 1998
- 3) S.R. Patil, R.S. Bhamare, M.D. Bhagat, D.M. Pandhare;
Algebra; Nirali Prakashan, 1998
- 4) S.R. Patil, R.S. Bhamare, M.D. Bhagat, D.M. Pandhare;SS
Discrete Mathematics ; Nirali Prakashan, 1998

Reference Books:

- 1) Seymour Lipschutz and Marc LarsLipson; Discrete Mathematics (Second Edition);
Tata McGRAW-HILL, Schaum's Outlines edition,1999.
- 2) C.L.Liu ; elements of Discrete Mathematics(second edition); McGRAW-HILL,
International Edition ,1985
- 3) Alan Doerr ,Kenneth Levasseur; Applied Discrete Structures for Computer Science;
Galgotia Publications Pvt. Ltd, New Delhi; 1997
- 4) Olympia Nicodemi; Discrete Mathematics ; CBS
Publishers&Distributors,Delhi, 1989
- 5) Bernard Kolman, Robert C. Busby,Sharon Ross; Discrete Mathematical Structures;
Third Edition, Prentice Hall of Pvt. Ltd, New Delhi-1997.
- 6) I.N. Herstein; Topics in algebra(Second Edition); Wiley Eastern Ltd. New Delhi-
1975.
- 7) A.R. Vasishtha; Modern Algebra; Krishna Prakashan Mandir Meerut,
- 8) H.S. Hall and S.R. Knight; Higher Algebra; H.M. Publications, 1994
- 9) Vijay Khanna and S.K. Bhambri; Introduction to Abstract Algebra
- 10) Shanti Narayan, Sat Pal ; A Text Book Of Modern Abstract Algebra; S.
Chand & Comp. And Ltd , 1985.

F.Y.B.Sc. (MATHEMATICS)

SEMESTER II

CS – 25 : COMBINATORICS AND ALGORITHMIC GRAPH THEORY -II

Course content

45 Lectures

[1] Graphs

- (1.1) Definition and Elementary results
- (1.2) Types of graphs
- (1.3) Isomorphism
- (1.4) Adjacency and Incidence matrix

[2] New Graphs from old one

- (2.1) Subgraphs and induced subgraphs
- (2.2) Complement of a graph, self-complementary graphs
- (2.3) Union, Intersection and Ring sum of two graphs

[3] Connected Graphs

- (3.1) Definitions of connected and Disconnected Graphs
- (3.2) Definitions of edge sequence, Trail, Path and Circuit, Elementary results
- (3.3) Isthmus, Cut-vertex
- (3.4) Vertex and Edge connectivity
- (3.5) Dijkstra's shortest Path Algorithm, Menger's theorem (without proof)

[4] Eulerian and Hamiltonian Graphs

- (4.1) Eulerian graphs, Definition, Examples
- (4.2) Characterization of Eulerian graphs in terms of degrees
- (4.3) Fleury's Algorithm
- (4.4) Hamiltonian graphs, Definition, Examples
- (4.5) Necessary condition for Hamiltonian graph (with proof)
- (4.6) Sufficient conditions for Hamiltonian graph (without proof)

[5] Trees

- (5.1) Definition and Equivalent characterizations, Elementary results
- (5.2) Centre of a Tree
- (5.3) Spanning trees and fundamental circuits and cutsets
- (5.4) Binary trees and elementary results
- (5.5) Kruskal's Algorithm for weighted spanning trees

[6] Directed Graphs

- (6.1) Different types, Examples
- (6.2) Directed trees, Arborescence, Polish Notation
- (6.3) Network and flows: Definitions, Examples, Construction of flows
- (6.4) Ford and Fulkerson's Algorithm
- (6.5) Binary prefix code
- (6.6) Binary search procedure

Text Books:

- 1) Prof . Mrs.M.D. Bhopatkar, Prof. C.S.Nimkar, Prof .Mrs. S.Joglekar; Discrete Mathematics; Vision Publications, 1998
- 2) Prof .Mrs. M.D.Bhopatkar, Prof. C.S.Nimkar, Prof .Mrs. S.Joglekar; Algebra; Vision Publications,1998
- 3) S.R. Patil, R.S.Bhamare, M.D.Bhagat, D.M.Pandhare; Discrete Mathematics; Nirali Prakashan, 1998
- 4) S.R. Patil, R.S.Bhamare, M.D.Bhagat, D.M.Pandhare; Algebra; Nirali Prakashan, 1998

Reference Books:

- 1) Seymour Lipschutz, Marc Lipson; Discrete Mathematics (Second edition); Schaum's Outlines, Tata McGraw-Hill Edition, 1999.
- 2) C.L.Liu; Elements of Discrete Mathematics(Second edition); McGraw-Hill International editions New York, 1977
- 3) Alan Doerr, Kenneth Levasseur; Applied Discrete Structures for computer Science; Galgotia Publications Pvt.Ltd, New Delhi,1997.
- 4) Olympia Nicodemi; Discrete Mathematics; C.B.S. Publishers & Distributors, Delhi 1989
- 5) Bernard Kolman, Robert C. Busby, Sharon Ross, (3rd edition); Prentice Hall of India Pvt Ltd, New Delhi, 1997
- 6) Norman L. Biggs; Discrete Mathematics, Revised Edition, Oxford Science Publications,1985.
- 7) J.P. Tremblay and R. Manohar; Discrete Mathematical structures with applications to computer science; Tata McGraw –Hill Edition, 1975
- 8) Narsingh Deo; Graph theory with Applications to Engineering & Computer Science, Prentice-Hall of India, New Delhi, 1987
- 9) K.D.Joshi; Foundations of Discrete Mathematics; New age International Ltd.1996.
- 10) V.Krishnamurthi; Combinatorics; East-West Press,1985.
- 11) Alan Tucker; Applied Combinatorics; John Wiley and Sons, New York, 1980
- 12) Dr. (Mrs) N.S. Bhave, Dr.T.T. Raghunathan; Elements of Graph Theory; Gaaj Prakashan, 1990.
- 13) Raghunathan, Nimkar, Solapurkar; A first step Graph theory

F.Y.B.Sc. (ELECTRONICS)

SEMESTER II

CS-26 : LINEAR ELECTRONICS – II

Course content

45 Lectures

1.Differential amplifier

Basic principle of operation

Different modes of operation

Parameters of differential amplifier

Differential Amplifier with constant current source

2.Operational Amplifier

Introduction to OP-AMP

Block diagram

Types of feedback

Concept of virtual ground

Parameters of IC 741

OPAMP applications - Inverting and non inverting amplifier, adder, subtractor, comparator, integrator and differentiator

Numerical problems.

3.Oscillators

Introduction to Oscillator.

Concept of positive feedback

Barkhausen criteria

Weinbridge oscillator, Phase Shift oscillator

Hartley, Colpitt oscillator

Crystal oscillator

Numerical problems.

4.Power Supply

Review of rectifiers,

Types of regulations.

Block diagram,working and specifications of regulated power supply

Switching mode power supply (**SMPS**)

Uninterrupted power supply (**UPS**)

REFERENCE BOOKS

1. Basic electronics by B. L. Theraja
2. Electronics principles by Malvino
3. Basic Electronics by Grob

F.Y.B.Sc. (ELECTRONICS)

SEMESTER II

CS – 27 : DIGITAL ELECTRONICS -II

Course content

45 Lectures

1.Flip-flops

Introduction to flip flop

RS flip-flop, Clock R-S flip-flop

JK flip-flop, Master-slave JK flip flop

D and T flip-flop.

Race around condition

Triggering in flip-flops,

Preset ,Clear, Delay (Definitions only)

Examples of commonly used flip-flops and their applications.

2.Counters

Introductions to counters.

Synchronous counter, Asynchronous counters,

Modular counters (MOD2, MOD5, MOD10)counter

Ring counter , Up-down counter,

study of IC 7490 (Internal block diagram).

3.Study of shift registers

serial and parallel data shifting. SISO (right and left shift), SISO ,PIPO AND PISO.

Study of IC 7495 .

4.Clock generating circuits

Introduction to IC555

Internal Block diagram of IC555

Working of IC 555 as a clock generator(Astable, monostable, bistable multivibrator),

Working of IC 741 as a clock generator (No derivations expected for the above, only formula and problems)

Duty cycles,Problems.

5.Semiconductor Memory

Introduction to memory devices.

RAM,ROM,PROM,EPROM

REFERENCE BOOKS:

3. Digital principles by Malvino and Leach
4. Modern digital electronics R. P. Jain

F.Y.B.Sc. (STATISTICS)

SEMESTER II

CS – 28 : COMPUTER ORIENTED STATISTICAL TECHNIQUES -II

Course content

45 Lectures

1 Probability

- 11 Idea of deterministic and non-deterministic models
- 12 Sample space (Finite and countably finite)
- 13 Events : types of events, operations on events
- 14 Probability : classical definition, relative frequency approach, probability models
- 15 Axioms of probability
- 16 Probability of events
- 17 Theorems on probability :

1) $0 \leq P(A) \leq 1$

2) $P(A) + P(A') = 1$

3) $P(A) \leq P(B)$ when $A \subset B$

4) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

1.8 Concept and definitions of conditional probability $P(A \cap B) = P(A)P(B/A)$

1.9 Concept and definitions of independence of two events

1.10 Numerical problems

2 Discrete Random Variables

21 Definition of random variable and discrete random variable.

22 Definition of probability distribution and distribution, Probability mass function.

23 Definition of expectation and variance, theorems on expectation.

24 Numerical problems

3 Standard Discrete Probability Distributions

31 Binomial distribution : definition, mean, Variance, additive property, illustrations of real life situations.

3.2 Poisson distribution : definition, mean, variance, additive property, approximation to binomial, illustrations of real life situations.

3.3 Numerical problems

- 4 **Continuous random variables**
 - 4.1 Definition through p.d.f.
 - 4.2 Distribution function : definition, statements of properties
 - 4.3 Definitions of mean and variance
 - 4.4 Numerical problems
- 5 **Standard Continuous Probability Distribution**
 - 5.1 Exponential distribution : p.d.f. with mean, nature of probability curve, mean, variance, lack of memory property.
 - 5.2 Normal distribution : definition of p.d.f., identification of parameters, Probability curve, standard normal distribution.
 - 5.3 Numerical problems
- 6 **Test of Hypothesis**
 - 6.1 Definitions : random sample, parameter, statistic, standard error of statistic.
 - 6.2 Concept of null and alternative hypothesis, critical region, level of significance, types of error, Concept of test of hypothesis, one sided and two sided tests.
- 7 **Large Sample Tests**
 - 7.1 $H_0 ; \mu = \mu_0$ Vs $H_1 = \mu \neq \mu_0$
 - 7.2 $H_0 = P=P_0$ Vs $H_1 = P \neq P_0$
 - 7.3 Numerical problems
- 8 **Small Sample Tests**
 - 8.1 Chi-square test for goodness of fit and 2 X2 contingency table
 - 8.2 t-test for testing $H_0 ; \mu=\mu_0$ Vs $H_1=\mu \neq \mu_0$
 - 8.3 Numerical problems

Books Recommended

- 8) Hogg R. V. and Craig, R. G.
Introduction to Mathematical Statistics.
- 9) Hoel. P. G.
Introduction to Mathematical Statistics.
- 10) Feller. W
Introduction to probability Theory and it's Applications. Vol –I
- 11) Mood A. M., Grabill, F. A. Boes D. C.
Introduction to Theory of Statistics.
- 12) Meyar P. L.
Introduction to Probability and Statistical Applications.
- 13) Goon, Gupta and Das Gupta
Fundamentals of Statistics Vol I & II
- 14) S. P. Gupta
Statistical methods.
- 15) Waikar and Lev.
Elementary Statistical Methods.
- 16) BIS Publication
Statistical Quality Control (Hand Book)
- 17) ATAG (Automotive Industries Action Group) :SPC/MMS manuals.
- 18) Samprit Chatterjee and Bertram Price.

- Regression analysis by Example (1991).
John Wiley and sons. Inc.
- 19) Guilford, J. P. and Fruchter B: Fundamental Statistics in Psychology and Education
(1980), Mc Graw Hill.
- 20) Mathur, Rajiv. Learning Excel-97 for windows step by step Galgotia

F.Y.B.Sc. (COMPUTER)

CS – I : LAB COURSE ON MS-OFFICE

List of Topics

- 1 .Computer setup in a laboratory
2. Operating system-DOS, Windows
3. Study of DOS commands (dir,cd,md,rd,copy,del,move, ren,date,time,ver,prn,type etc.)
4. Creation of Batch File
5. Creating bitmaps using paintbrush.
6. Use of clipboard.
7. Creating presentation using Powerpoint, importing picture,text etc.
8. Creating letters, table, using Ms-Word Facilities like font, page layout, document formatting, spellcheck, print preview, template etc.
9. Creating a Spreadsheet using MS-Excel (Introduction, Sorting, Queries, Chart , Macros)

NOTE : Atleast 16 assignments must be performed.

F.Y.B.Sc. (Computer)
CS – II : Lab Course on C

List Of Topics

1. Programs based on condition checking and control structures (e.g. inverting Number, checking whether number is prime, finding GCD and LCM etc.)
2. Program using Function, Recursion
3. Program using Arrays, character array, (counting of character words, lines and white spaces etc.)
4. Programs on Integer arrays – one dimensional and two dimensional (converting to any base and matrix arithmetic)
5. Programs on pointer
6. Programs on Structure and Unions.
7. Programs on structure within structure
8. Programs on File handling.

NOTE : At least 16 assignments must be performed.

F.Y.B.Sc. (ELECTRONICS)

CS – III : LAB COURSE FOR ELECTRONICS

Note : Any 8 experiments should be performed from section - I)

SECTION -I

1. Identification of circuit components.
2. Use of CRO signal generators , power supplies and multimeters.
3. CRO for frequency ,phase and amplitude measurements.
4. Verification of KCL,KVL,Thevenin's and Norton's theorems.
5. Verification of maximum power transfer theorem.
6. LCR series and parallel resonance.
7. Crystal Oscillator.
8. Diode as clipper and clamper
9. Diode as half wave ,full wave and bridge rectifier.
10. OP-AMP parameters.
11. OP-AMP applications as adder –subtractor

SECTION -II

(Note : Any 8 experiments should be performed from section - II)

1. Study of 7490 as a counter.
2. Transistor as a switch.
3. FET characteristics.
4. SCR characteristics.
5. Study of logic gates.
6. Study of flip-flops
7. Verification of Demorgan's theorem and conversion of one gate to other.
8. Study of half and full adder and subtractor.
9. Study of shift register IC 7495.
10. Study of up down counter
11. Study of phase shift oscillator.

S.Y.B.Sc. (Computer)

SEMESTER – III

CS -31 : PROGRAMMING IN C++

Course content

60 Lectures

1. Introduction :-

Object Oriented Programming Paradigm, Basic Concepts of OOP, Object Oriented Languages

2. Beginning with C++ :-

Structure , tokens , keywords , identifiers ,Basic Data Types , User defined Data Types , symbolic constants ,variable declaration ,operators.

3. Functions :-

Prototypes, call by reference , Inline functions , default arguments , friend function.

4. Classes :-

Specifying a class , defining a member function , a C++ program using class , access modifiers , Memory allocation for objects , static data members , array of objects ,constructors and destructors , parameterized constructors , multiple constructors in a class , dynamic initialization of objects ,

5. Inheritance and polymorphism :-

Defining Derived class, single inheritance , multilevel inheritance , virtual base classes, function overloading , operator overloading , virtual functions , Abstract class.

6. I / O Stream Classes :-

C++ streams , C++ stream classes , unformatted I/O operators , Manipulators.

Reference Books:-

1. Let us C++ By Yashwant Kanetkar
2. Object Oriented Programming with C++ By E. Balguruswamy.

S.Y.B.Sc. (COMPUTER)

SEMESTER – III

CS 32: VB.NET TECHNOLOGY- I

Course content

60 Lectures

1. Introduction to .Net Technology

Framework common Language Runtime, Common Language Specification
Intermediate Language Code, Just-In-Time Compiler, Assemblies, Manifest,
Metadata, Global Assembly Cache

2. VB.NET Development Environment

Creating Applications
Building Projects
Using simple components
Running VB.NET applications

3. Variables and control statements

VB.Net: Variables, keywords, constants, data types, conditional
Statements, looping statements, case control statements,

4. Windows Forms

Text Box, Buttons, Labels, Checks Boxes, radio Buttons, List Boxes, Combo Boxes,
Picture Boxes, Scrollbars, Timer, Menus, Built-in Dialogs, Image List, Toolbars, Status
Bar and Progress bars, Debugging

5. Object Oriented Programming in VB.NET

Class and Objects, Properties, methods and events, Constructor and Destructor,
Method overloading, Inheritance, Access modifiers: Public, Private, Protected,
Friend, Overriding and shadowing, Interfaces, Polymorphism,

Reference Books :-

1)MCAD / MCS D

Developing Windows-Based Applications
With Microsoft Visual Basic.Net and Visual C# .Net
By Mattjew Stoecker

2)MCAD / MCS D

Developing Web-Based Applications
With Microsoft Visual Basic.Net and Visual C# .Net
By Jeff Webb

3)Programming Microsoft VB.NET Microsoft Press

By Belena

4) Programming Microsoft VB.NET ASP.NET

By Dino Esposito

S.Y.B.Sc. (MATHEMATICS)

SEMESTER – III

CS – 33 : OPTIMIZATION TECHNIQUES

Course content

60 Lectures

[1] Linear Programming :-

- (1.1) Advantages, Limitations, Definitions, Terminology, Formulation of L.P.P.
- (1.2) Solution by Graphical Method & Simplex Method, Special Cases
- (1.3) Duality – concept, Interrelation between a Primal and Dual, Advantages, Interpretation of dual

[2] Transportation Problems :-

- (2.1) Introduction, General structure of transportation problem
- (2.2) Unbalanced Transportation Problem
- (2.3) North-West Corner Method, Least Cost Method, Vogel's Approximation Method
- (2.4) MODI Method, Stepping Stone Method,
- (2.5) Degeneracy in Transportation Problem
- (2.6) Maximization in Transportation Problem
- (2.7) Prohibited Transportation Problem
- (2.8) Numerical Problems

[3] Assignment Problems :-

- (3.1) Statement and Mathematical representation of Assignment Problem
- (3.2) Unbalanced Assignment Problem
- (3.3) Hungarian Method of Solving A.P. (Minimization Case)
- (3.4) Maximization Assignment Problem
- (3.5) Multiple Assignment Problem
- (3.6) Prohibited Assignment Problem
- (3.7) Numerical Problems

[4] Sequencing Models :-

- (4.1) Introduction, General Assumptions, Terminology
- (4.2) Processing n-jobs through two machines
- (4.3) Processing n-jobs through three machines
- (4.4) Processing two jobs through m-machines
- (4.5) Processing n-jobs through m-machines
- (4.6) Numerical Problems

[5] Theory of games

- (5.1) Two persons zero sum game, pure and mixed strategies , statement of the minimax theorem
- (5.2) Graphical method for solving $2 \times m$ principles and b dominance and $n \times 2$ games and solving some simple games
- (5.3) Connection between the game problem and Lp problem. simple games

Text Books :

Prof S.R.Patil; Prof S.G.Gujrathi; Prof D.M. Pandhare;
Numerical Methods And Operation Research; Nirali Prakashan,1998.

Reference Books:

1.

- 1 R.J. Dromey; How To Solve It By Computer; Prentice-Hall Of India; 1982
- 2.V.K.Kapoor; Operations Research; Sultan Chand & Sons Educational Publishers, New Delhi; 1985.
3. S.D.Sharma; Operations Research;Kedar Nath Ram Nath & Co. Publishers, Meerut, 1972.
- 4 L.C. Jhambh; Quantitative Techniques Vol I & II; Everest Publishing House, Pune-1998.
5. N.D. Vohra; Quantitative Techniques in Management (Second Edition); Tata McGraw-Hill Publishing Company Limited New Delhi; 1990.
6. Kanti Swarup, P.K.Gupta, Man Mohan; Operations Research; Sultan Chand & Sons Educational Publishers, New Delhi, 1977.
7. P.K.Gupta, D.S.Hira; Operations Research ; S.Chand & Company Ltd, New Delhi. 1979.
8. N.Paul Loomba; Linear Programming TMH Edition; Tata McGraw-Hill Publishing Company Limited, New Delhi, 1971.

S.Y.B.Sc. (MATHEMATICS)

SEMESTER – III

CS- 34 : COMPUTATIONAL GEOMETRY

Course content

60 Lectures

[1] Analytical Geometry of Three Dimensions and Line

- (1.1) Vector Algebra (Revision) Scalar Triple Product
- (1.2) Direction Cosines and Direction Ratios
- (1.3) The Plane and Equations of Planes
- (1.4) System of Planes
- (1.5) Lines and Equations of Line
- (1.6) Angle Between a Line and a Plane
- (1.7) Coplanar Lines
- (1.8) Vector Equation of a Line-Passing Through Given Point and Parallel to a Given Vector, Passing Through Two Given Points, Passing Through a Given Point and Perpendicular to Given Vectors.
- (1.9) Shortest Distance Between Two Skew Line (Vector Method) – Magnitude and Equation.
- (1.10) Parametric Equation of a Line.
- (1.11) Intersection of Lines and Segments (Vector Method), Distance of a Point from a line.

[2] Plane

(2.1)

Vector equations of a Plane-passing through a given point and parallel to given two vectors, passing through three given points, in terms of the perpendicular distance from the origin to the plane and normal unit vector to the plane, passing through a given point and perpendicular to given vector, through the line of intersection of two planes.

- (2.2) Angle between two Planes (Vector Method).
- (2.3) Angle between a Line and a Plane (Vector Method).
- (2.4) Vector equation of the Planes bisecting the Angles between the given two Planes.
- (2.5) Vector equation of the Line of intersection of two given Planes.
- (2.6) Coplanarity of Straight Lines.
- (2.7) Vector equation of plane passing through two Coplaner Lines.
- (2.8) Distance of a Point From a Plane (Vector Method).

[3] Vector Space

- (3.1) Definition of Vector Space and its properties
- (3.2) Subspaces and examples and its properties
- (3.3) Linear Span
- (3.4) Linearly Dependence
- (3.5) Basis and Dimension of Vector Space
- (3.6) Finite Dim. Vector Space
- (3.7) Coordinate Vector

[4] Linear Transformations

- (4.1) Definition and properties of Linear Transformation
- (4.2) Kernel and Range : Definition, Properties, rank, Nullity, Dimension Theorem(without proof)
- (4.3) Linear Transformation from \mathbb{R}^n to \mathbb{R}^m and Standard Matrix
- (4.4) Representation of a Linear Transformation by matrices

TEXT BOOKS:

- (1) S.Y.B.Sc. (Computer Science) Sem.-I, Paper-I Linear Algebra, Nirali Prakashan
- (2) S.Y.B.Sc. (Computer Science) Sem.-I, Paper-I Linear Algebra, Vision Publication
- (3) S.Y.B.Sc. (Computer Science) Sem.-II, Paper-I, Computational Geometry, Nirali Prakashan
- (4) S.Y.B.Sc. (Computer Science) Sem.-II, Paper-I, Computational Geometry, Vision Publication
- (5) F.Y.B.Sc.. (Computer Science) Geometry and Calculus, Nirali Prakashan
- (6) F.Y.B.Sc.. (Computer Science) Geometry and Calculus, Vision Publication

REFERENCE BOOKS:

- (1) G.S. Pandey And R.R.Sharma; Vector and Geometry ; Wishwa Prakashan
- (2) P. Balsubrahmanyam, K.G. Balsubrahmanyam, G.R.Venkataraman;
Coordinate Geometry of two and three Dimensions; Tata McGRAW-HILL, New Delhi
- (3) David F. Rogers, J Alan Adams; Mathematical Elements for Computer Graphics (Second Edition); McGRAW-HILL International Editions.1990
- (4) William M. Newman, Robert F. Sproul; Principles of Interactive computer Graphics (Second Edition); International Student Edition, McGraw-Hill Book company, Tokyo. 1979.

S.Y.B.Sc. (ELECTRONICS)

SEMESTER – III

CS-35 : MICROPROCESSORS

Course content

60 Lectures

- 1. Computer Organization**
ADC, DAC, different registers ,Memory organization –Cache memory,virtual memory,associative memory and memory management technique.
- 2. General Architecture of Microprocessor**
Historical background of microprocessors, general operation of microprocessors, comparative study of 8086, 80286, 80386, 80486, Pentium etc.
- 3. Architecture of Pentium processors**
Introduction, real mode and protected mode operation, different registers in Pentium, functional description, Pentium data organization, assembler directives.
- 4. Instruction Set**
Instruction classification, addressing modes, study of different instructions of Pentium,.Assembly programs like addition, subtraction, multiplication ,division ,code conversion ,data conversion, finding largest no. from given array, searching characters, sorting strings (ascending, descending), problems on linked list etc.
- 5. Assembly Language programming basics**
Language hierarchy, machine language,assembly language,Compiler ,cross compiler, assembler .
- 6. Interrupt Processing in Pentium**
Difference between Hardware and Software interrupts, Difference between maskable and non-maskable interrupts, interrupt vector address table, the interrupt processing procedures, multiple interrupts and interrupts priorities, special function interrupts, DOS interrupt 21H,interrupt function codes.
- 7. Multiple Microprocessor System and Buses**
Closely and Loosely coupled systems, multiple bus microprocessor systems.

Reference books

1. Microprocessor and interfacing by Douglas Hall.
2. Computer organization and Architecture by William Stallings
3. The Intel Microprocessor by Barry B.Brey.
4. Computer architecture and organization by Rifiqzaman and Chandra.
5. Assembly language programming by Peter Abel
6. The Pentium Microprocessor by James Antonakos(PEA)
7. The Intel Microprocessor by Barry.B.Brey
8. How Computer Works by RonWhite,Techmedia Publication.

S.Y.B.Sc. (ELECTRONICS)

SEMESTER – III

CS-36 : Principles of Communication

Course content

60 Lectures

- 1. Introduction to Electronics Communication**
Importance of Communication, Elements of communication systems, Electromagnetic spectrum, type of communication, Concepts of communication system: channel bandwidth, Nyquist theorem, S/N ratio, channel capacity, error handling, Shannon theorem, companding, Data rate, baud rate, serial communication and protocol.
- 2. Modulation and Demodulation.**
Basics of modulation and Demodulation Introduction to Modulation techniques: Analog -Amplitude, Phase, Frequency modulation, Digital modulation, PAM, PCM, delta modulation, MODEM – concept of ASK, FSK, QPSK, MSK, GMSK.
- 3. Multiplexing and Multiple Access Techniques.**
Space division multiplexing, Time division multiplexing, Frequency Division Multiplexing, Code division multiplexing, Introduction to multiple access, FDMA, TDMA, Spread spectrum multiple access: Frequency Hopped Multiple access, CDMA, Hybrid spread spectrum techniques, SDMA.
- 4. Introduction to wireless Communication.**
Introduction to antennas, Parameters of antenna, multi element antennas, multidirectional and omni directional antenna, micro strip antenna, Concept of wireless communication. Wireless communication architecture, Ad-hoc networks, Protocols- listing and details of RFID.
- 5. Mobile communication**
Introduction to mobile communication, Cellular concept, Working of GSM: Hand over, RTS-CTS protocol, Introduction to GPRS, IR transmission, blue tooth Applications.

Recommended Books:

1. Digital and Data Communication, 4th edition by Micheal A. Miller.
2. Telecommunication switching system and networks by Thiagarajan Vishwanathan.
3. Communication Electronics by Frenzel Louis E.
4. Wireless Communication, 2nd edition. Rappaport.
5. Mobile Communication. Schiller Jochen.
6. Communication systems: analysis and design. Stern and Mahmoud.

7. Wireless and mobile network Architectures. Yi-Bang LIN.
8. Wireless Communication Technology. Imrich Chal amtac.

S.Y.B.Sc. (COMPUTER)

SEMESTER-IV

CS-41 : DATA STRUCTURES WITH C++

Course content

60 Lectures

1. Introduction :-

Data types ,data objects , data structure , time and space complexity.

2. Arrays :-

Concept , arrays in C++ , storage representation of arrays, applications , sparse matrices.

3. Searching and sorting Techniques:-

Linear and binary search , simple exchange , merge sort , selection , insertion

4. Stacks :-

Concept , definition , operations , Implementation , declaration , functions , applications (recursion , Infix , Prefix, Postfix **expressions**)

5. Queue :-

Concept , definition , operations , types , implementation , applications , priority queues , multiple queues.

6. Linked List :-

Concept , implementation , operations , types , stack and queue using linked list , Generalised linked list.

7. Trees :-

Terminology , representation of binary trees , tree traversals , creating a binary search tree ,breadth first search , depth first search , node structure of a threaded binary tree, creating a threaded binary tree , height balanced tree , Extended binary tree , applications

Reference Books:-

1. Data structures in C++ By Tanenbaum.
2. Data structures By Horitz And Sahani.

**S.Y.B.Sc. (COMPUTER)
SEMESTER-IV**

CS- 42 : VB.NET TECHNOLOGY II

Course content

60 Lectures

1. ADO.Net

Database : Connections, Data adapters, and datasets, Data Reader, Multiple Table Connection, Data binding with controls like Text Boxes, List Boxes, Data grid etc. Navigating data source, Data Grid View, Data form wizard, Connection Objects, Command Objects, Data Adapters, Dataset

2 Web application

Introduction to Web form, Page directive, all validation controls, Page redirection

3. Web services

Concept of web services, Create a small web services

4. Windows Application using C#

Introduction to C#, Difference between C# and VB.Net, Textbox, Label, Command button etc.

5. File Handling

File handling using FileStream, StreamWriter, StreamReader, BinaryReader, BinaryWriter classes.

Exception - type of errors, structured and unstructured exception.

Tracing errors: breakpoint, watch, quick watch

6. Crystal Report

Connection to Database, Table, Queries, Building Report, Modifying Report, Header, Footer, Details, Group Header, Group footer, Summary Working with Multiple Tables, SQL in Crystal Report, Report Templates,

Reference Books :-

1)MCAD / MCSD

Developing Windows-Based Applications
With Microsoft Visual Basic.Net and Visual C# .Net
By Mattjew Stoecker

2)MCAD / MCSD

Developing Web-Based Applications
With Microsoft Visual Basic.Net and Visual C# .Net
By Jeff Webb

3)Programming Microsoft VB.NET Microsoft Press

By Belena

4) Programming Microsoft VB.NET ASP.NET

By Dino Esposito

5) Mastering Crystal Report - BPB Publication

6) Crystal Report – The Complete Reference: - Tata McGraw Hill

S.Y.B.Sc. (MATHEMATICS)

SEMESTER-IV

CS- 43 : COMPUTER ORIENTED NUMERICAL METHODS

Course content

60 Lectures

[1] PERT and CPM Computations

- (1.1) Phases of project scheduling
- (1.2) Network logic , numbering the events (Fukerson's rule.)
- (1.3) Measure of activity
- (1.4) PERT: forward and backwad pass computations slack , critical path.
- (1.5) CPM terms, critical path, float.

[2] Solutions of Non – linear Equations

- (2.1) Location of Roots
- (2.2) Bisection, Secant, Regula-Falsi and Newton-Raphson methods, Comparison of these methods
- (2.3) Acceleration of convergence Aitken's Process

[3] Polynomial Interpolation & Approximation

- (3.1) Finite differences: Forward, Backward and Central
- (3.2) Detection of errors using different tables
- (3.3) Newton's backward and forward formulae for interpolation
- (3.4) Lagrange's interpolation formulae for unequal intervals
- (3.5) Least square approximation by Polynomials up to third degree

[4] Numerical Differentiation and Integration

- (4.1) Numerical differentiation using interpolating polynomials
- (4.2) Trapezoidal rule, Simpson's $(1/3)^{\text{rd}}$ rule and Simpson's $(3/8)^{\text{th}}$ rule
- (4.3) Extrapolation to the limit : Ramberg Interpolation

[5] Solution of Ordinary Differential Equations & solution of Simultaneous Linear Equations

- (5.1) Numerical Integration By Tayler Series
- (5.2) Euler's method
- (5.3) Runge-Kutta method: 2nd and 4th orders
- (5.4) Predictor corrector method
- (5.5) Gaussian Elimination, Pivoting Strategy, Conditional Equations
- (5.6) Modfication of Gaussian Elimination to Compute Inverse of Matrix
- (5.7) Comparison of direct and iterative methods

Text Books :

Prof S.R.Patil; Prof S.G.Gujrathi; Prof D.M. Pandhare;
Numerical Methods And Operation Research; Nirali Prakashan,1998.

Reference Books:

- 1.S.S.Sastry; Introductory methods of Numerical Analysis ; Prentice-Hall of India (3rd edition) 2000
2. J.H.Mathews; Numerical methods for Mathematics, Science and Engineering (2nd edition); Prentice-Hall of India ,1994.
3. R.J. Dromey; How To Solve It By Computer; Prentice-Hall Of India; 1982
4. Anthony Ralston,Philip Rabinowitz; A First Course in Numerical Analysis; (2nd edition) International Student edition; McGraw-Hill Book Company; TOKYO; 1978
5. Computer Oriented Numerical Methods-Rajaraman.
6. Introduction To Numerical Analysis-C.E. Froberg.
7. Introduction To Applied Numerical Analysis-C.E.Froberg.
8. Numerical Methods that works-Forman S. Action.
- 9.Numerical Methods in Fortran-J.M.Mcormik.
10. Numerical Methods For SC & Engg - R.G.Stanton (Prentice Hall)

S.Y.B.Sc. (MATHEMATICS)

SEMESTER-IV

CS- 44 : COMPUTER GRAPHICS

Course content

60 Lectures

[1] Two Dimensional Transformations

- (1.1) Introduction
- (1.2) Representation of Points
- (1.3) Transformation and Matrices
- (1.4) Transformation of Points
- (1.5) Transformation of Straight Line
- (1.6) Midpoint Transformation
- (1.7) Transformation of Parallel Lines
- (1.8) Transformation of Intersecting Lines
- (1.9) Transformations: Rotation, Reflection, Scaling, Shearing
- (1.10) Concatenated Transformations
- (1.11) Transformation of a Unit Square
- (1.12) Solid Body Transformations
- (1.13) Translations and Homogeneous Coordinates
- (1.14) Rotation about an arbitrary Point
- (1.15) Reflection through an Arbitrary Line
- (1.16) Overall Scaling , Point at Infinity
- (1.17) Projection – a Geometric Interpretation of Homogeneous Coordinates

[2] Three Dimensional Transformations

- (2.1) Introduction
- (2.2) Three Dimensional-Scaling, Shearing , Reflection, Translation, Rotation
- (2.3) Multiple Transformation
- (2.4) Rotation About - an axis parallel to a coordinate axis, an arbitrary axis in space
- (2.5) Reflection through an arbitrary plane.
- (2.6) Affine and Perspective Geometry.
- (2.7) Orthographic Projections.
- (2.8) Axonometric Projections.
- (2.9) Oblique Projections
- (2.10) Single Point Perspective Transformations.
- (2.11) Vanishing Points

[3] Plane Curves

- (3.1) Introduction
- (3.2) Curve Representation
- (3.3) Non-Parametric Curves.
- (3.4) Parametric Curves.
- (3.5) Parametric Representation of Circle.
- (3.6) Parametric Representation of Ellipse.
- (3.7) Parametric Representation of Parabola.
- (3.8) Parametric Representation of Hyperbola

[4] Space Curves

- (4.1) Beizer Curves –Introduction , Definition, Properties (without proof), Curve Fitting (Upto $n=3$), Equation of Curves in Matrix form (upto $n=3$)
- (4.2) B-Spline Curve-Introduction ,Definition, Properties (without proof)

TEXT BOOKS:

1. S.Y.B.Sc. (Computer Science) Sem.-I, Paper-I Linear Algebra, Nirali Prakashan
2. S.Y.B.Sc. (Computer Science) Sem.-I, Paper-I Linear Algebra, Vision Publication
3. S.Y.B.Sc. (Computer Science) Sem.-II, Paper-I, Computational Geometry, Nirali Prakashan
4. S.Y.B.Sc. (Computer Science) Sem.-II, Paper-I, Computational Geometry, Vision Publication
5. F.Y.B.Sc.. (Computer Science) Geometry and Calculus, Nirali Prakashan
6. F.Y.B.Sc.. (Computer Science) Geometry and Calculus, Vision Publication

REFERENCE BOOKS:

- (1) G.S. Pandey And R.R.Sharma; Vector and Geometry ; Wishwa Prakashan
- (2) P. Balsubrahamanyam, K.G. Balsubrahamanyam, G.R.Venkataraman;
Coordinate Geometry of two and three Dimensions; Tata McGRAW-HILL, New Delhi
- (3) David F. Rogers, J Alan Adams; Mathematical Elements for Computer Graphics (Second Edition); McGRAW-HILL International Editions.1990
- (4) William M. Newman, Robert F. Sproul; Principles of Interactive computer Graphics (Second Edition); International Student Edition, Mcgraw-Hill Book company, Tokyo. 1979.

S.Y.B.Sc. (ELECTRONICS)

SEMESTER-IV CS- 45 : MICROCONTROLLER

Course content

60 Lectures

- 1. 8051 microprocessor block diagram**
Registers, Flags, PSW, PC, Input/Output Pins, Ports, internal memory, External memory Oscillator and Clock, counters and Timers, Serial Data IO Transfer, Interrupts. Instruction set in brief.
- 2. I/O port programming: sensor and indicators interface**
8051 I/O programming, I/O bit manipulation programming.
- 3. Timer and counter programming**
Programming 8051 timers, counter programming timer interrupts, programming timers 0 and 1 in 8051 .
- 4. Serial port programming with and without interrupt**
8051 interrupts, programming timer interrupts, programming external hardware interrupts, serial communication interrupt, interrupt priority in the 8051
- 5. Real world interfacing:**
Parallel and serial ADC, DAC interfacing.
- 6. Embedded systems:**
Definition, examples, classification in size and real time requirements, software tools required for development- cross assemblers, cross compilers, locators, loaders, simulators, emulators

Recommended systems:

1. “The 8051 Microcontroller and Embedded systems using Assembly and C”, by Rolin D.MckinlaySecond Edition. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. by Mckinlay.
2. “The 8051 Microcontroller Architecture, Programming & Application”, Third Edition. KENNETH AYALA, DELMAR CENGAGE FEARNING.
3. “Programming Embedded systems with ‘C’ and GNU development tools” Second Edition. Michael Barr and Anthony by Massa.
4. Programming and customizing the 8051 microcontroller by Myke Predko.
5. Embedded systems Architecture, Programming and Design by RajKamal.

S.Y.B.Sc. (ELECTRONICS)

SEMESTER-IV

CS-46 : DIGITAL SIGNAL PROCESSING

Course content

60 Lectures

1. Electronics Signals and Systems

Basics: Concept of signal and signal processing, Block diagram representation of a DSP system classification of signals, concept of sampling of CT signals, presentation of DT signals.

Fourier Transform: Fourier Transform, Concept of Amplitude and phase spectrum of CT signals, Discrete Time Signals, Discrete Fourier Transform, Inverse DFT, Fast Fourier Transform.

Concept of convolution and co-relation

Concept of transfer function of DT system, Impulse response, Time and frequency domain analysis of DT system using transfer function, concept of realization of transfer function.

2. Time and Frequency Domain analysis of DT signals

Laplace Transform: Definition, inverse Laplace transform, Properties of LT Application in t-domain, s-domain signal analysis.

Z-transform: Definition, Inverse Z-transform, difference equation and its solution.

Digital Filters: Concept, Impulse Invariant and BLT method for designing of DT filters, IIR and FIR filters, brief introduction of window technique for DT filters.

3. Digital Signal Processor

Digital signal processor Architecture, Multiplier and Accumulators, ALU and Barrel Shifter, Memory and Cache, Register, Buses, peripheral interfaces.

4. Applications of DSP

Practical A/D and D/A converters: important parameters.

Audio signals processing in detail, Summary of the DSP applications for the Filtering, Modulation, demodulation, Motion control and positioning, seismography, Radar, Sonar, noise reduction and echo cancellation, speech recognition, interference rejection, image processing.

Recommended Books:

1. Digital Signal Processing, 2006 Edition. S.Salivahan, A.Valuraj, C. Gnanapriya.
2. Digital Signal Processing: A hands on Approach, 2006 Edition. Charles Schuller, Mahesh Chugani.
3. Digital Signal Processing:- Principals, Algorithms and Applications. John G Proakis, Dimitris G monolkis.
4. Digital Signal Processing:- A practical Guide for Engineers and Scientists. Steven W. Smith, Newnws.
5. Computer Algorithms in Signal Processing. Palan N.G.
6. Signals and Systems. Haykin Simon, Veenvan Barry.
7. Network Analysis and Synthesis. Bhat P.V.
8. DSP using MATLAB John Prokis.

S.Y.B.Sc. (COMPUTER)

CS – IV : LAB COURSE ON C++ AND DATA STRUCTURES

List of Topics

Write C++ programs :-

1. using control structures.
2. using class.
3. Implementing inheritance.
4. Using function overloading.
5. Using encapsulation.
6. Using friend function.
7. Using virtual function.
8. Using operator overloading(unary, binary operators)
9. Using I/O manipulators.
10. Sorting methods(Simple exchange sort , Bubble sort , Quick sort , Insertion sort , Selection sort)
11. Stack.
12. Queue.
13. Linked List.
14. Binary Tree .
15. Searching methods (Linear search , Binary search).

NOTE : Atleast 16 assignments must be performed.

S.Y.B.Sc. (COMPUTER)

CS- V : LAB COURSE ON VB.Net Technology

LIST OF TOPICS

1. Program using Arithmetic Operations, Factorial of a number.
2. Program for Palindrome.
3. Program for Prime Number.
4. Program for checking whether number is Odd or Even
5. Using – Simple Nested If, Select Case structure, Control Structure.
6. Programs using- Option Buttons.
7. Programs using List / combo Box.
8. Programs using Check Boxes.
9. Programs using Text Box.
10. Creating Database using data Control.
11. Creating Reports.
12. Program for Calculator
13. Program for creating Notepad
14. Program for Registration form
15. Program for Billing Form.

S.Y.B.Sc. (ELECTRONICS)

CS –VI : LAB COURSE FOR ELECTRONICS.

(Note : Any 8 experiments should be performed from section - I)

SECTION -I

1. Study of SMPS.
2. Study of 8038 function generators.
3. .DC motor drive and speed control (Transistorized circuit)
4. I-V characteristics temperature sensor AD 590.
5. Analog multiplexers.
6. Analog to Digital converter using discrete components/IC LM 234/74148 or IC 7109
7. Comparison of Monostable using IC-741 and IC-74121.
8. Study of amplitude modulation and demodulation
9. Study of frequency modulation.
10. Study of pulse amplitude modulation.
11. Simple assembly language program with Pentium to find square root of a given number , to find smallest and largest number, for decimal to binary conversion, for binary to decimal conversion.
12. Simple assembly language program with Pentium Simple assembly language program with Pentium to find sorting of a string (ascending/descending)
13. Simple assembly language program with Pentium to read and display printer status.
14. Arithmetic and logical problems String addition, Largest/Smallest number in String, hex to decimal conversion and vice versa.

SECTION –II

(Note : Any 8 experiments should be performed from section - II)

1. Digital to Analog converter using discrete components.
2. Thumbwheel to seven segment display.
3. Absolute decoding and linear select decoding.
4. Temperature to frequency / voltage converter
5. Reed relay control using digital logic.
6. Frequency generation using 8051 micro controller.
7. To study waveform generator (square, triangular and saw tooth using DAC) with microcontroller.
8. Build and test FSK Modulation/ Demodulation.
9. Build and test TDM.
10. Demonstration of working of Wi-fi card.
11. Demonstration Experiment on RFID application.
12. Study of Fourier Analysis of Different Wave shapes.
13. Synthesis of Waveforms using multiple sine waves.

T.Y.B.SC. (COMPUTER)

SEMESTER –V

CS– 51 : OPERATING SYSTEMS

Course content

60 Lectures

1. Introduction to operating system

Simple monitor, buffering and spooling, I/O memory and cpu protection

2. Functions of operating system

Services to the user-programs, System Call concept and interrupts

3. File systems

Types of Files, Structure of a disk, block file operation. Allocation methods, Access methods, Directory structure

4. Scheduling concepts

Scheduling algorithms, First come First , Shortest Job First, preemptive algorithm with example

5. Memory Management

Relocation, Swapping , Overlap swapping , Multiple partition and segmentation
Paging , Demand paging, page replacement algorithm

6. I/O scheduling

First come first, Shortest-seeking-first, elevator algorithm. Comparison of algorithm

7. Resource allocation

Deadlock prevention, Deadlock avoidance, Deadlock and recovery

8. Concurrent Processes

Fork and Join constructs, Process concept, Semaphores

Reference Books:

1. Operating System By Peterson
2. Unix Operating Systems By Bach
3. Unix System V By Morgan, Mcgilton
4. Advanced Unix – A proggmmer’s Guide – Stephen Prata
5. Unix system V Release 4 – Sumitabha Das

T.Y.B.Sc. (COMPUTER)

SEMESTER –V

CS- 52 : WEB SUPPORTING TECHNOLOGIES

Course content

60 Lectures

1. Internet concept

- History & Need of Internet
- Http & other protocols
- Arrangement of the Networks**
- Client/Server Concepts
- Need for a common & Simple Language
- Internet tools
- Internet architecture and packet switching
- Internet security

2. Domain

DNS Domain Name Representation

- DNS Approach
- Domain server and resolver

3. HTML

Basic Tags

- HTML Attributes
- Basic Layout (Text, color & Background, Table, Image)
- Frame
- Style Sheets

Form

4. Java Script

- Script Basic
- Java Script Primer (Blocks, Data, Function, Flow Control, Array)
- Document and Window objects
- Event Handling

5. DHTML

- Dynamic Styles
- Dynamic contents

Reference Books

- HTML 4 Unleashed (Second Edition) : Techmedia
- The Complete Reference HTML : Tata McGRAW-HILL 3rd Edition
- The Complete Reference Java 2 : Tata McGRAW-HILL 4th Edition

T.Y.B.Sc. (COMPUTER)

SEMESTER –V

CS – 53 : COMPUTER COMMUNICATION AND NETWORKING

Course content

60 Lectures

1. Introduction to Networks and Networking Concepts :

Networking fundamentals

Needs of Networking

Local and wide Area Networks.

Advantages and disadvantages.

A Networking Lexicon

Clients, peers and Servers

The Network Medium Carriers

Network protocols

Network Software

Network Services

- Network Types

peer-to-peer networking

Server-based Networking

Storage-area Networking

Hybrid Networks

Hardware requirements

- Selecting the right Type of Network

- Basics of Communication Networks

Point-to-point and Multidrop circuits

The telephone Network

Switched and non-switched options in communication

Connection oriented and connectionless networks

2. Networking Medium

- Network Cabling: (Tangible physical media)

General Cable characteristics

Base band and Broadband Transmission

The importance of Bandwidth

Co-axial, Twisted-pair, Fiber-optic Cable, UTP

- Wireless Networking: (Intangible Media)

Types of wireless networks

Wireless LAN application

Wireless LAN Transmission

Wireless Extended LAN Technologies

Microwave Networking Technologies

High-speed wireless Networking Technologies

3. Network Architecture

- OSI and 802 Networking models
 - Role of Reference Model
 - OSI Network Reference model
 - IEEE 802 Networking Specifications
- Ethernet
 - Overview of Ethernet
 - 10/100 Mbps IEEE Standards
 - Gigabit Ethernet
 - Frame Types Ethernet
 - Segmentation Concept
- Token Ring
 - Token Ring fundamentals
 - Hardware components
 - Structure of Token Ring
- Apple talk and ARCnet
- FDDI
 - Broadband Technologies
 - Broadcast Technologies
 - ATM and SONET Concepts

4. Networking devices

- Network Interface Cards (NIC)
 - Basics of NIC and operation
 - Principles of NIC Configuration
 - Special purpose NIC, Wireless adapters and Remote Boot adapters
 - Device Driver Software
- Equipment Perspective
 - Repeater ,Bridge ,Router ,Gateways
 - Protocol Specific Devices
 - Router Technology , Multiplexer
 - Network Switches

Reference Books:-

- Computer Networks by Uyless Black.
- Computer Communication and Networking Technologies by Michael A Gallop and Willam Hancock
- Networking Essential, BPB Publication
- Introduction to Networking by Barry Nance, PHI publication.
- Networking Essential, by Ed Tittle and David Johnson Thomson Learning.
- Computer Networks Andrew S Tanenbaum
- Data & Computer Communication William Stallings.

T.Y.B.Sc. (COMPUTER)

SEMESTER –V

CS – 54 : DATABASE MANAGEMENT SYSTEMS

Course content

60 Lectures

1. Introduction to DBMS

Concept , definition , attribute , tuple , table , keys , data abstraction,
Cardinalities , data models , language independence , DBMS types

2. Relational Database design

Dependencies : Functional, transitive , multi -valued.

Normalization : First ,Second ,Third normal form.

Desirable properties of decomposition

(lossless -join , dependency preservation)

3.Database Administration Issues

Data dictionary, entity Integrity, referential integrity,

Data security, database security, & DBA,

Specifying privileges using GRANT , Data base backup.

4 . Transaction Management

Transaction states ,ACID properties ,schedulers of transaction,

transaction control, System log, two-phase commit protocol,

database recovery & backup (types of failures , recovery concepts),

check points.

5. Concurrency Control

Locking methods, two phase locking protocol,deadlock handling

Reference Books :-

1. Database system concepts by Korth.
2. Fundamentals of database systems by Nawathe.
3. An introduction to database system by Bipin Desai.
4. Client server computing from Dummies.
5. Oracle 7 by Ivan Bayross.
6. Database Management Systems by C. J. Date

T.Y.B.SC. (COMPUTER)

SEMESTER –V

CS – 55 : SOFTWARE ENGINEERING

Course content

60 Lectures

1) System Concept

Definition Elements of Systems, Types of System , System Boundary, Interface.

2) System Analysis

Definition, Role of System Analyst, Requirement, Anticipation, Requirement Investigation, Requirement Specification, Feasibility Study, Fact Finding Methods Interview, Questionnaire, Record review / sampling, observation.

3) Diagrammatic Representations

Context level DFD's 1st & 2nd level DFD's
Functional Decomposition Diagram
E-R Model, Study of Physical System Structure Chart

4) Decision Tools

Decision Tree, Decision Table, Structured English.

5) System Design

Normalization, Database Design.
I/P Screen Design, O/P formal Design.
Prozeduml Design.

6) System Development Life Cycle

- Waterfall Model – Spiral Model

7) Prototyping

8) Data Dictionary

9) Qualities of Good Software

Reference Books:

- 1) Analysis of Information Systems.- James Senn
- 2) Software Engineering.- Rojer Pressman
- 3) System Analysis and Design.- Elias Awad

T.Y.B.SC. (COMPUTER)

SEMESTER –V

CS -56 : THEORETICAL COMPUTER SCIENCE

Course content

60 Lectures

1. Finite Automata and Regular Expressions

Preliminaries, Finite State Machines, Non-deterministic Finite Automata (NFA)
Finite Automata with ϵ Moves, Regular Expressions, Regular Languages
/Grammars, Finite Automata with output Definition of Moore and Melay Machine
& Equivalence. Equivalence of Regular Expression and Finite Automata.

2. Properties of Regular Sets

Pumping Lemma for regular sets., Closure properties of regular.
Minimizing Finite Automata, Myhill-Nerode Theorem.

3. Context free Grammar

Introduction, Types of Grammar , Regular Grammar, Equivalence of regular
Grammar and Finite Automata , Derivation Trees, Ambiguity.
Simplification of Context Free Grammars ,Removing Useless Symbols and
Productions, Chomsky Normal Form, Greibach Normal Form.

4. Push Down Automata

Informal Description and Definition.

Equivalence of accepted by Final State and Empty state Equivalence of PDA and
CFL.

5. Introduction to Turing Machine

Basic Turing Machine Model with Simple example for language recognition only.

Reference Books:

- 1) Introduction to Automata Theory.
- Hapcraft, Ullman
- 2) Principles of compiler construction
- Aho, Ulman, Sethi
- 1) Introduction To system software .
- By D..k Dhamdhare
- 2) System Programming By john Donovan

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SEMESTER-VI

CS -61 : UNIX PROGRAMMING

Course content

60 Lectures

- 1. Introduction**
Function and types of an Operating System, Overview of the Unix/Linux system, Architecture of OS, File systems in Unix/Linux, introduction to operating system concepts
- 2. Single/Compound Unix/Linux Commands**
Ls, cp, rm, mv, mkdir, cd, rmdir, finger, elm, write, mail, >, >>, <, <<, tee, etc.
- 3. Filtering Commands**
Sed , Tr , perl , grep , egrep, fgrep
- 4. Study and use of Bourne/bash shell**
Shell variables, Shell Scripts, Shell meta characters , shell commands
- 5. Shell Scripts**
Looping and making choices –for case, while, until, if, test, trap statements, error checking, shell scripts examples, use of expressions, countdown loop, printing of files, multiple options, passing arguments to scripts, shell commands
- 6. G/AWK Programming**
AWK commands, shell program through AWK variables, looping, array, Functions calls through AWK
- 7. Study and use of Linux utilities and Tools**

Reference Books:

1. Operating System By Peterson
2. Unix Operating Systems By Bach
3. Unix System V By Morgan, Mcgilton
4. Advanced Unix – A programmer's Guide – Stephen Prata
5. Unix system V Release 4 – Sumitabha Das

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SEMESTER-VI

CS -62 : CORE JAVA

Course content

60 Lectures

1. Introduction to JAVA

History of Java

Features of Java

JDK Environment

The Java Virtual Machine

Garbage Collection

2. Programming Concepts of Basic Java

Identifiers and Keywords

Data Types in Java

Java coding Conventions

Expressions in Java

Control structures, decision making statements

Arrays and its methods

3. Objects and Classes

Object Fundamentals

Pass by value

'this' reference

Data hiding and encapsulation

Overloading

Overriding

Constructors

Finalization

Subclasses (Inheritance)

Relationship between super class object and subclass object

implicit subclass object to super class object Conversion

Dynamic method dispatch

4. Language Features

scope rules

static data, static methods, static blocks

all modifiers of class, method, data members and variable

Abstract Classes

Interfaces

Inner classes

Wrapper Classes

packages

Package access

importing packages and classes

user define packages

5. Exception Handling

Types of Exceptions

try, catch, finally, throws keywords

creating your own exception

exceptions and Inheritance

6. Multithreading

Multithreading Concept

Thread Life Cycle

Creating multithreading Application

Thread Priorities

Thread synchronization

7. Abstract Window Toolkit

Components and Graphics

Containers, Frames and Panels

Layout Managers

-Border Layout

-Flow Layout

-Grid Layout

- Card Layout

AWT all Components

Event Delegation Model

-Event Source and Handlers

-Event Categories, Listeners, adapters

-Anonymous Classes

Applets

-Applet Life Cycle

-Applet Context

-Inter applet communication

Books :

1. Core JAVA 2 Vol -1, 2 by Cay S Horstmann Gary Cornell , The Sun Micro Systems Press, New Delhi
- 2 Java by Example 1.2 by Jerry R Jackson Alan L., McClellan
3. Programming with java, A Primer by E. Balguruswamy, The Sun Micro Systems Press, New Delhi
4. Java How to Program by Deitel and Deitel, Prentice Hall Upper Saddle River, New Jersey 07458 (US)

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CS – 63 : OPEN SOURCE TECHNOLOGIES

SEMESTER – VI

Course content

60 Lectures

1. Introduction

Open source concepts , applications.

2. PHP

PHP Basic, Intro , Install, Syntax, Variables, String, Operators, If...Else
Switch , Arrays , While Loops , For Loops , Functions , Forms

3. PHP XML

XML Expat Parser , XML DOM
XML SimpleXML

4. PHP Reference

Array , Calendar , Date , Directory
Error , File system , Filter
FTP , PHP HTTP , PHP Libxml ,PHP Mail

5.Security

Authentication (User logins)
Authorization (Permissions)
Encryption

6. Model View Controller Pattern

Designing Large Applications

7. Code Generation

cron scripts
Web Services
Putting it all together

8.Case Studies : Apache, BSD, Linux, Mozilla (Firefox), Wikipedia,

Joomla, GCC,
Open Office.
Open Source Projects
Open source applications and its competitors

Reference Books :-

- 1) Programming PHP - Kevin tatore
- 2)Practical PHP programming - Huddson

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SEMESTER-VI

CS - 64 : DATABASE MANAGEMENT WITH ORACLE

Course content

60 Lectures

1. Learning SQL :-

Purpose , features ,advantages, use of Create , Insert, Select statements,
Update ,delete as well as alter statements
Order by, Group by, Like , In , Between ..and clauses,
Database and Table Schema Statements
Data Manipulation using standard Functions
Table Statements and Functions including string ,date, time and mathematics
Flow Control Functions

2. SQL- A relational Database Language

Simple queries ,expressions ,condition & operations
Nested queries , sub queries

3. Advanced SQL topics

PL/SQL blocks , creating & using stored procedures, database triggers,
Designing & using triggers, use of Raise application error procedure

4. Parallel databases and Distributed Databases

Parallel query evaluation ,data partitioning,
Distributed databases ,types of DDBMS,
storing data in a distributed data ,
catalog structure, distributed data independence.

5. Object oriented DBMS

OOPS concepts , object database systems,
Advantages of OODBMS , disadvantages of OODBMS

6. Data Mining and Warehousing

Data mining , data warehouse ,multimedia databases,
DSS (Decision support system).

Reference Books :-

- 1) Teach yourself EQL in 14 days by Jeff Parkins.
- 2) Oracle 7 by Ivan Bayross.
- 3) Database Management Systems by C. J. Date

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SEMESTER-VI

CS- 65 : UML AND OBJECT ORIENTED DESIGN

Course content

60 Lectures

1)Object Modeling

Characteristics of objects, Object oriented development object oriented Themes, Use of OOD, object and Classes links and association, Generalization, Inheritance Grouping Constructs, Aggregation, Abstract Class, Multiple Inheritance, Restriction.

2)Dynamic Modeling

Events and States, Operations, Nested State Diagrams.

3)Design Methodology

Steps in Analysis & Design, Decomposition of System

4)Introduction to UML

Overview of the UML, Conceptual Model of UML Architecture.

5)Basic Structural Modeling

Classes, Relationships, Common Mechanism, Class Diagrams Object Diagram.

6)Basic Behavioral Modeling

Interactions, Use Cases, Use CASE Diagram, Interaction Diagrams, Activity Diagrams.

7)Architectural Modeling

Components, Component Diagram.

Reference Books:

- 1)Object Oriented Analysis.- James Rumbaugh
- 2)The Unified Modeling Language User Guide.- Goody Booch, James Rumbaugh, Ivar
- 3)UML in a Nut Shell.- Orelly
- 4) UML Distilled – Fowler (II Edition)

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SEMESTER –VI

CS – 66 : COMPILER CONSTRUCTION

Course content

60 Lectures

1.Introduction

Components Of System Software, Introduction to software processors, Model of a computer and computer simulator(SMAC0)

2.A Simple Assembler

Assembler for Smac0 , Design of one/two pass assembler , Macro and Macro preprocessor

3.Linkers & Loaders

Loading , linking and relocation, program relocation, program relocatability, Overlay

4.Programming Language

Features & Introduction To Compilers
Introduction, Phases, Grouping of Phases.

5.Scanning

Functions of Scanner, Tokens-token type and value, Buffering, look as heads transition diagrams, hand coding a scanner.
Regular Expressions, Finite Automata.
Scanner Generation – LEX.

6.Parsing

Representations of Grammars – BNF, Syntax graphs.
Derivation, Sequential Forms, Sentences, Parse Tree, Ambiguities.
Left Recursion, Top down parsing, Recursive decent Parsing.
Bottom up parsing | Parsar table construction

7.Run Time Structure.

Symbol Tables, Scope Checking, Storage allocation, Recursion. Activation records, displays, parameter, parsing.

Reference Books:

- 1)Introduction to Automata Theory-Hapcraft, Ullman
- 2) Principles of compiler construction-Aho, Ulman,Sethi
- 3)Introduction To system software - D..k Dhamdhare
- 4)System Programming - john Donovan

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CS –VII : LAB COURSE ON UNIX PROGRAMMING

LIST OF TOPICS

1. Simple Unix Commands – ls, mv, cp, cd etc.
2. Filtering Commands- sed, tr, perl etc.
3. Shell Scripts- Use of For , case, while etc.
4. Shell Scripts- Use of multiple options, passing arguments to shell
5. AWK programming
6. Writing Simulator for SMAC0 and Smac0 programs
7. Writing Assembler
8. Interrupt Handler
9. Toy shell
10. MS- Dos patching
11. Writing simple macro –preprocessor

NOTE : Atleast 16 assignments must be performed.

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CS - VIII : LAB COURSE ON WEB SUPPORTING TECHNOLOGIES AND JAVA

HTML

Create web page, Which uses following tags:-

1. Heading, Body, Paragraph, Listing, Marquee tag
2. Anchor, Image, Table tags, Frame Layout
3. Form, Button, combo box, List box, Check box.

JAVA SCRIPT

Write Java-script program on following:-

1. Control structure
2. Function
3. Arrays
4. Objects
5. Create calculator

JAVA

Write a Java program, which uses:-

1. Control Structure
2. Array
3. Package
4. Interface
5. Exception Handling.
6. Event Handling
7. Applet

NOTE : Atleast 16 assignments must be performed.

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CS –IX : LABORATORY COURSE ON ORACLE AND SOFTWARE PROJECT

List of Topics

1. Create simple tables.
2. Create tables using various data constraints.
3. Create tables using existing tables.
4. Queries using insert, delete, update statements.
5. Simple queries using functions.
6. Creating data reports.
7. Assignment on nested queries.
8. Building of PL/SQL blocks.
9. Usage of procedures.
10. Usage of triggers.

NOTE: At least 16 assignments must be performed.

Note: An Industrial visit should be arranged and report should be submitted at the end of academic year.
