**CENTRE FOR COMPUTER STUDIES**
**DIBRUGARH UNIVERSITY**
**DIBRUGARH**

# SYLLABUS FOR THREE YEAR (SIX SEMESTER) BACHELOR OF COMPUTER APPLICATION (BCA) COURSE (Effective from July, 2005 Session)

Recommended by the Board of Studies in Computer Science on 02/05/2005.
Approved by the Academic Council on 12/05/2005.

There will be Six Semesters covering three Calendar years. Each semester will cover 600 marks and every paper of each semester will carry 100 marks. All papers are compulsory. A students has to carry out one Minor Project in Fifth Semester and one Major Project in Sixth Semester based on real life situations.

The evaluation pattern of the students' performance in each of the papers will be as follows:

(a) In-semester evaluation: 25% marks (based on sessional examinations, home assignments, attendance, seminars, library works, installation of hardware and software, viva-voce)
(b) End-semester Evaluation: 75% marks (University final examinations at the end of the semester)

**GUIDELINE FOR IN – SEMESTER EVALUATION:**

1. The objective of the In-semester evaluation is to be such that the students can face the real world challenges. In-semester evaluation shall be based on two sessional examinations, home assignments, attendance, seminars, library work, installation of hardware and software and viva-voce test in each semester. The 25% marks in each paper may be distributed as follows giving appropriate weightage

   a) Sessional Examination I

   b) Sessional Examination-II

   c) Home assignments, Seminar & Group Discussion.

   d) Attendance, installation of hardware and software, verification of various units of Computers and viva-voce test.

   Home assignments may be given to the students at any time during the semester. The DMC/Staff meeting shall prepare their own guideline for conducting seminars, Group Discussion etc. Marks for seminar, Group Discussion shall be common to all papers. The total internal marks in (a) to (d) would be 25% of the total marks allotted to the paper.

2. Each sessional examination shall be of one hour duration and shall be conducted by the concerned teacher(s) of each paper. The setting of question paper, invigilation duty, evaluation of answer scripts for each paper shall be done by the concerned teacher(s) as a part of his/her normal duty. The teacher concerned shall fix the date of the sessional examination in each paper following the guideline. The students shall write the answers in proper University answer books.

3. After evaluation, the answer scripts should be shown to the students and corrections should be made if necessary. After this the answer scripts should be collected back from the students. The entire process of evaluation of a sessional examination should not take more than 10 days from the date of examination

4. There shall be no provision for "repeat" in the sessional examination. If a student misses any sessional examination for unavoidable reasons, then the concerned teacher may allow the student to appear in a separate examination at his/her own discretion.

5. If a paper is taught by more than one teacher then the concerned teachers shall co operate in conducting the internal evaluation. Each sessional examination for a particular paper shall be of one hour duration even if it is taught by more than one teacher.

6. At the end of each sessional examination the concerned teacher(s) shall submit the marks after finalisation along with the answer scripts to the Head of the Department (HOD)/Director.

7. The teacher in-charge shall notify dates for seminar, Group Discussion and shall keep a record of marks secured by the students and handover the marks to the HOD/Director. All teachers of the Department/Centre are expected to take part in the process.

8. The HOD/Director will fix date(s) for viva-voce of students of each semester where all teachers of the Department/Centre shall take part. The date(s) shall be fixed preferably before or immediately after the End semester examination.

9. The HOD/Director will place the matter of finalising the In-semester marks in the DMC/staff meeting. The staff meeting/DMC will take necessary steps to finalise, scrutinise, and tabulate the marks in the prescribed format and send them to the Controller of Examinations along with the answer scripts of Sessional Examinations immediately after finalisation as soon as possible.

10. Two models for distribution of 25% marks are shown below. The DMC/Staff meeting may decide a suitable model of their own from the following giving appropriate weightage of distribution of marks.

**Model – I**

| Sl. No. | Name | Average of two Sessional (15) | Attendance (90% and above =2marks 80%-90%=1mark) (2) | Home Assignment/ Seminar/Group Discussion (5) | Viva-voce (3) | Total (25) |
|---|---|---|---|---|---|---|
| | | | | | | |

**Model – II**

| Sl. No. | Name | Average of two sesssional (14) | Attendance (90% and above =2marks 80%-90%=1mark) (2) | Home Assignment/ Group Discussion (3) | Installation of Software/ Hardware (3) | Viva-voce (3) | Total (25) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

11. The seminar and viva-voce in fifth and sixth semester may be on the project.

**GUIDELINE FOR END –SEMESTER EVALUATION:**

1 End-semester evaluation shall be through a final examination at the end of each semester. The DMC/Staff committee of the Centre for Computer Studies, Dibrugarh University shall meet in the months of October and April to decide the dates of the odd and even end-semester examinations respectively in consultation with the Controller of Examinations. The Controller of Examination shall then make necessary arrangements for notifying the dates of the End Semester Examinations and other procedures as per Dibrugarh University Rules (at least 20 days in advance).

2 Each paper shall have 75% of the total marks for evaluation. The end – semester examination for each paper shall be of three hours. Out of total marks of each paper, 10% marks shall be of objective type, 20% marks shall be of short answer type and 70% marks shall be of long answer type.

3 Setting of question papers, moderation of question papers, evaluation of answer scripts, scrutiny, tabulation of marks, etc. and announcement of results, shall be governed by the Dibrugarh University Examination Ordinance 1972 (as amended up to date).

4 The Registrar or his authorised officer shall maintain the performance record of each student. This shall be the official record of the University.

## Course Structure

### FIRST SEMESTER

Paper 1.1 COMPUTER FUNDAMENTALS
Paper 1.2 MATHEMATICS – I
Paper 1.3 COMMUNICATIVE ENGLISH
Paper 1.4 DIGITAL DESIGN
Paper 1.5 PERSONALITY DEVELOPMENT
Paper 1.6 LABORATORY (PROGRAMMING IN C, FUNDAMENTAL OF COMPUTERS)

### SECOND SEMESTER

Paper 2.1 MATHEMATICS – II
Paper 2.2 DISCRETE STRUCTURES
Paper 2.3 DATA STRUCTURE
Paper 2.4 ACCOUNTING AND FINANCIAL MANAGEMENT
Paper 2.5 COMPUTER ARCHITECTURE AND ORGANIZATION
Paper 2.6 LABORATORY (DATA STRUCTURE IN C, C++, TALLY)

### THIRD SEMESTER

Paper 3.1 MATHEMATICS – III
Paper 3.2 THEORY OF COMPUTING
Paper 3.3 INTERNET AND WEB PROGRAMMING
Paper 3.4 COMPUTER GRAPHICS
Paper 3.5 DESIGN AND ANALYSIS OF ALGORITHMS
Paper 3.6 LABORATORY (INTERNET, COMPUTER GRAPHICS)

### FOURTH SEMESTER

Paper 4.1 NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING
Paper 4.2 DATABASE MANAGEMENT SYSTEM
Paper 4.3 OPERATING SYSTEMS
Paper 4.4 PROGRAMMING PARADIGMS
Paper 4.5 ENVIRONMENTAL STUDIES
Paper 4.6 LABORATORY (FORTRAN, DBMS, OPERATING SYSTEMS)

### FIFTH SEMESTER

Paper 5.1 DATA COMMUNICATION AND COMPUTER NETWORKS
Paper 5.2 OPERATION RESEARCH
Paper 5.3 SOFTWARE ENGINEERING
Paper 5.4 MINOR PROJECT
Paper 5.5 LABORATORY (NETWORKING AND SOFTWARE ENGINEERING)

### SIXTH SEMESTER

Paper 6.1 ETHICS IN INFORMATION TECHNOLOGY
Paper 6.2 SYSTEM SOFTWARE
Paper 6.3 MAJOR PROJECT
Paper 6.4 LABORATORY (SYSTEM SOFTWARE)

## Bachelor of Computer Application ( B. C. A.) Course

### FIRST SEMESTER

| Paper No. | Subject | Theory (working hours/ week) | Programming Lab (working hours/week) | Duration of university exams (hours) | Maximum Marks | |
|---|---|---|---|---|---|---|
| | | | | | End semester | In semester |
| 1.1 | COMPUTER FUNDAMENTALS | 3 | ~~ | 3 | 75 | 25 |
| 1.2 | MATHEMATICS – I | 3 | ~~ | 3 | 75 | 25 |
| 1.3 | COMMUNICATIVE ENGLISH | 3 | ~~ | 3 | 75 | 25 |
| 1.4 | DIGITAL DESIGN | 3 | ~~ | 3 | 75 | 25 |
| 1.5 | PERSONALITY DEVELOPMENT | 3 | ~~ | 3 | 75 | 25 |
| 1.6 | LABORATORY (COMPUTER FUNDAMENTALS, PROGRAMMING IN C) | ~~ | 6 | 3 | 75 | 25 |

**TOTAL MARKS: 600**

### PAPER –1.1 COMPUTER FUNDAMENTALS

**Unit 1: Introduction to computer and information technology** **Marks: 20**

Brief history of development of computers, computer system concepts, capabilities and limitations, types of computers: Analog, Digital, Hybrid, general, special purpose, Micro, mini, mainframe super computers, generations of computers, personal computers, types of personal computers – Laptop, Palmtop etc.

**Unit 2: Computer organisation and working:** **Marks: 15**

Basic components of computer system, Input devices, output devices, storage devices.

**Unit 3: Computer software**: **Marks: 20**

Need of software, types of software, system software and application software, programming languages, machine, assembly, high level, 4GL, their merits and demerits. Application software-word processing, spread sheet, presentation graphics, database management software

**Unit 4:** **Marks: 20**

Introduction to Computer virus, Introduction to Operating Systems (Disk operating system, windows, Linux, Unix etc. )

**BOOKS:**


1. *Introduction of Computer Sc*. ITL ESL Pearson Education India
2. Rajaraman, V.; *Computer Fundamentals*,

## PAPER –1.2 MATHEMATICS – I

**Unit I - Mathematical Logic:** **Marks: 10**

Prepositional logic – syntax, semantics, laws of deduction, normal forms, resolution, theorem proving; First order logic – universal and existential quantifiers, syntax, terms of predicate

**Unit II - Combinatorics:** **Marks: 10**

Permutations; Combinations; Counting; Summation

**Unit III - Discrete Structures:** **Marks: 10**

Sets; Cartesian product, relations – their types; Functions; Partial orders; Lattices,

**Unit IV - Mathematical Statistics:** **Marks: 15**

Collection of data, frequency distribution, measures of central tendency and dispersion; Probability – concepts, Baye's Theorem; Concepts on Discrete and Continuous random variables and distributions – binomial, Poisson and normal distributions

**Unit V - Complex Numbers:** **Marks: 10**

Complex number as an ordered pair, operations on complex numbers, DeMoivre's Theorem, roots of complex numbers

**Unit VI - Matrix Algebra:** **Marks: 20**

Elementary concepts, matrix operations, rank and inverse of a matrix, solution of algebraic equations – consistency conditions; Determinants and their properties

**BOOKS:**


1. *Discrete Mathematical Structure;* Trembly, Manohar, TMH
2. *Engineering Mathematics*; H.K. Dass, S.Chand
3. *Higher Algebra(Classical)*; S.K.Mapa, Asoke Prakashan
4. *Fundamental of Mathematical Statistics*; Gupta & Kapoor, S.Chand


## PAPER –1.3 COMMUNICATIVE ENGLISH

**Unit I:** **Marks: 15**

**General Introduction:** Importance of English its Position, Communicating in English: Difference between the spoken and the written form, How to start dealing with hesitation and shyness.

**Pronunciation:**

English vowels and consonants (RP), Getting to know the IPA, Words generally mispronounced-she, see, seat, cheat, etc, Difference between spelling and pronunciation, Choice of a proper model, Practical exercises.

**Unit II: Grammar:** **Marks: 9**

Determiners, Tense, Use of prepositions, Common errors, Practical exercises

**Unit III: Modes of Communication:** **Marks: 13**

Request, Command, Permission, Wish, Practical exercises

**Unit IV: Conversation:** **Marks: 13**

Starting a conversation, Things to be kept in mind while engaging in conversation-fluency, accuracy, appropriateness, Planning, Turn taking, Practical exercises.

**Unit V: Situational Conversation:** **Marks: 13**

Facing an interview board, Telephone talk, Wishes etc., Conversation with elders, friends, strangers etc., Terms related to different professions (Banking, Travel agency, Business etc.), Public speaking (Addressing a meeting; Debate; Group Discussion etc.), Practical exercises.

**Unit VI: Features of Good Writing:** **Marks: 9**

Writing reports, Writing letters for business and office use, Writing complaints, Placing orders

**BOOKS:**


1. Bansal, R.K. and J.B. Harrison. *Spoken English for India*. Orient Longman.
2. Hornby, A.S. *Advance Learner's Dictionary of Current English.* OUP
3. Thorat, Ashok et al. *Enriching Your Competence in English*. Orient Longman
4. Singh, Vandana. *The Written Word*. Oxford.
5. Forum for English Studies. *Twentieth Century Prose*. Oxford
6. Bhatia, Pravin S. R. & Sheikh, A.M.; *Professional Communication Skills*, S. Chand

## PAPER –1.4 DIGITAL DESIGN

**Unit I: Representation of information:** **Marks: 20**

**Number system:** binary, octal and hexadecimal; positive and negative numbers, fixed and floating point

**Arithmetic operations:** addition subtraction, multiplication and division of numbers

**Character codes:** ASCII, codes for error detection and correction, concept of hamming distance

**Unit II: Logic Design:** **Marks: 20**

Boolean algebra & Switching function. Minimisation and realisation using logic gates.

**Unit III:** **Marks: 15**

Multiplexers , decoders, encoders.

**Unit IV: Sequential circuits:** **Marks: 20**

flip flops, registers, and counters.

**BOOKS**:


1. Moris Mano, *Digital Design, 2/e*, PHI 1995.
2. Kohavi, Z., *Switching Finite automata theory, 2/e* Tata McGraw Hill, 1995.
3. Malvino, A. P. and Leach, D. K., *Digital principles and applications*, McGraw Hill.


## PAPER –1.5 PERSONALITY DEVELOPMENT

**Unit –I**: **Personality Meaning:** **Marks: 15**

Personality determinants, personality traits, theory of personality, development of personality from infancy to maturity, emotions and personality

**Unit –II: Attitude:** **Marks: 15**

Concepts of attitude, formation of attitude, types of attitude, change of attitude values: Concepts of values types of values and behaviour habits learning and unlearning of habits.

**Unit –III: Motivation:** **Marks: 15**

Meaning of motivation, nature of motivation, need of motivation personality development self-development steps of personality developments.

**Unit –IV: Communication:** **Marks: 15**

Meaning of communication, communication process communication barriers

**Unit –V:** **Marks: 15**

Oral communication steps to effective communication, written communication weakness in written communication preparing presentation, how to write curriculum vitae.

**BOOKS:**


1. Mohan, Krishna & Banerjee, Meera, *Developing Communication Skills*, McMillan India Ltd.


## Paper –1.6 LABORATORY BASED ON FUNDAMENTAL OF COMPUTERS, PROGRAMMING IN C

**Unit I: Practical on Paper 1.1** **Marks: 15**

**Unit II: Programming in C** **Marks: 60**

From fundamental to Pointer, Array, Structure, Union, Data structure, File Handling

**BOOKS:**


1. Kanetkar, Y., *Let Us C*, BPB
2. Gottfried, B. S., *Programming in C*, Tata McGraw Hill
3. Balaguruswamy, E.; *Programming in ANSI C*, Tata McGraw Hill

## SECOND SEMESTER

| Paper No. | Subject | Theory (working hours/ week) | Programming Lab (working hours/week) | Duration of university exams (hours) | Maximum Marks | |
|---|---|---|---|---|---|---|
| | | | | | End semester | In semester |
| 2.1 | MATHEMATICS – II | 3 | ~~ | 3 | 75 | 25 |
| 2.2 | DISCRETE STRUCTURE | 3 | ~~ | 3 | 75 | 25 |
| 2.3 | DATA STRUCTURE | 3 | ~~ | 3 | 75 | 25 |
| 2.4 | ACCOUNTING AND FINANCIAL MANAGEMENT | 3 | ~~ | 3 | 75 | 25 |
| 2.5 | COMPUTER ARCHITECTURE AND ORGANISATION | 3 | ~~ | 3 | 75 | 25 |
| 2.6 | LABORATORY (DATA STRUCTURE IN C, C++, TALLY) | ~~ | 10 | 3 | 75 | 25 |

**TOTAL MARKS:** **600**

### PAPER – 2.1 MATHEMATICS – II

**Unit I - Differential Calculus:** **Marks: 30**

Limits, continuity and differentiability, differentiation, Rolle's Theorem, MVTs, Taylor's and Maclaurin's theorems with remainders, indeterminate forms, partial derivatives and differentials, Euler's theorem on homogeneous functions, maxima and minima of single and multiple variables – Lagrange's multiplier

**Unit II - Integral Calculus:** **Marks: 25**

Indefinite integral, elementary methods of integration, definite integrals – reduction formulae, application of integral calculus – length, area, volume. Idea of multiple integrals

**Unit III - Differential Equations:** **Marks: 20**

Ordinary differential equations of the first order, exactness and integrating factors, variation of parameters, solutions of homogeneous equations,

**BOOKS:**


1. *Engineering Mathematics*; H.K. Dass, S.Chand
2. *Advance Engineering mathematics*; E. Kreyszig Wiley Eastern.
3. *Differential Equation*; Piaggio
4. *Mathematical Analysis*; .C. Malik, Savita Arora

## PAPER –2.2 DISCRETE STRUCTURES

**Unit I - Algebraic Structures:** **Marks: 30**

Groups, Rings, Fields - fundamental concepts; Vector spaces – linear dependence of vectors, linear transformations, bilinear forms, eigen values and eigen vectors

**Unit II - Graph Theory:** **Marks: 45**

Basic terminologies, multigraphs and weighted graphs, paths and circuits, shortest paths in weighted graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, planar graphs, trees and rooted trees, spanning trees and cut sets, colouring, covering and partioning, directed graphs, enumeration of graphs, ideas on graph theoretic algorithms and applications

**BOOKS:**


1. Lipschutz, Seymour; Lipson, Marc, *Discrete Mathematics, Second Edition, Schaum's Outlines*, Tata McGraw-Hill, 2003.
2. Deo, Narsingh, *Graph Theory*, Prentice-Hall of India Private Limited.
3. Hoffman and Kunz, *Linear Algebra*; Pearson Education(Singapore)
4. V.K.Khanna and S.K. Bhambri; *A Course in Abstract Algebra*; Vikas Publishing House


## PAPER –2.3 DATA STRUCTURE

**Unit I:** **Marks: 15**

**Basic concepts:** Data structure, algorithms**.**

**Basic data types:** stack, queues, lists. Recursion

**Unit II: Trees:** **Marks: 15**

Definition and implementation: binary tree, tree traversal, postfix, prefix notations, Heap

**Unit III: Sets:** **Marks: 15**

Definition and implementation hash table, priority queues

**Unit IV: Sorting algorithms:** **Marks: 10**

Quick sort, insertion sort, Bubble sort, merge sort.

**Unit V: Searching algorithms**: **Marks: 10**

Linear search, Binary search, depth first search and breadth first search techniques

**Unit VI: File Structure**: **Marks: 10**

Sequential, Index sequential file structure.

**BOOKS:**


1. Weiss., M.A. *Data structure and algorithm analysis in C*. Addison -Wesley, 1993
2. Tanenbaum, A. S., Langsam. Y. and Augenstein, M. J., *Data structure using C;* PHI,1996
3. Aho, A. H., Hopcroft, J. E. and Ullman, J.; *Data structures and algorithms,* Addison-Wesley, 1987.


## PAPER –2.4 ACCOUNTING AND FINANCIAL MANAGEMENT

**Unit 1:** **Marks: 15**

**Accounting:** Principles, concepts and conventions, double entry system of accounting, introduction of basic books of accounts of sole proprietary concern, control accounts for debtors and creditors, closing of books of accounts and preparations of trial balance.

**Final Accounts:** Trading, profit and loss accounts and balance sheet of proprietary concern with normal closing entries, introduction to manufacturing account, final account of partnership firms, limited company.

**Unit II:** **Marks: 15**

**Financial Management:** Meaning and role

**Ratio Analysis:** Meaning, Advantages, Limitations, types of ratios and their usefulness

**Unit III:** **Marks: 15**

**Fund Flow Statement:** Meaning of the terms – fund, flow of fund, working capital cycle, preparation and interpretation of the fund flow statement

**Costing:** Nature, importance and basic principles, budget and budgetary control, nature and scope, importance, method of finalization of master budget and functional budgets

**Unit IV:** **Marks: 1**5

**Marginal Costing:** Nature, scope and importance. Break-even analysis, its uses and limitations, construction of break even chart, practical application of marginal costing

**Standard Costing:** Nature and scope, computation and analysis of variances with reference to material cost, labour cost and overhead cost, interpretation of the variances

**Unit V: Introduction to Computerized Accounting System:** **Marks: 15**

Coding logic and codes required, master files, transaction files, introduction to document used for data collection, processing of different files and outputs obtained

**BOOKS:**


1. Bhattacharya, A. K.; *Financial Accounting for Managers;* PHI
2. Bhattacharyya, S. K.; *Accounting for Managers;* Vikas Publishing House
3. Chandra, P; *Financial Management;* Tata McGraw Hill


**PAPER –2.5 COMPUTER ARCHITECTURE AND ORGANISATION**

**Unit I:** **Marks: 10**

The Von Neumann Architecture.

**Unit II: ALU organisation:** **Marks: 10**

Simple ALU organisation, arithmetic processor

**Unit III: Control Unit:** **Marks: 10**

Hardwired and microprogrammed control

**Unit IV: Memory Organization:** **Marks: 15**

Primary memory, secondary memory, high speed memory, virtual memory.

**Unit V: I/O Transfer**: **Marks: 15**

Program controlled, interrupt controlled and DMA

**Unit VI:** **Marks: 15**

Introduction to computer buses, peripherals, performance bench marking and current trends in architecture.

**Unit VII:** **Marks: 10**

Assembly language programming

**BOOKS**:


1. Tanenbaum, A. S.; *Structured computer organisation*, PHI, 1994.
2. Hamacher, V. C., Vranestic, Z. G. and Zaky, S. G., *Computer organisation, 2/e* McGraw Hill, 1990.
3. Hayes, J. P.; *Computer architecture and organisation*, McGraw Hill, 1988
4. Pal Chaudhuri, P., *Computer organisation and design*, PHI, 1994.


**PAPER –2.6 LABORATORY BASED ON DATA STRUCTURE IN C, C++, TALLY**

Unit I – Practical on Paper 2.3 Marks: 45

Unit II – Practical on Paper 2.4 Marks: 30

**THIRD SEMESTER**

| Paper No. | Subject | Theory (working hours/ week) | Programming Lab (working hours/week) | Duration of university exams (hours) | Maximum Marks | |
|---|---|---|---|---|---|---|
| | | | | | End semester | In semester |
| 3.1 | MATHEMATICS – III | 3 | ~~ | 3 | 75 | 25 |
| 3.2 | THEORY OF COMPUTING | 3 | ~~ | 3 | 75 | 25 |
| 3.3 | INTERNET AND WEB PROGRAMMING | 3 | ~~ | 3 | 75 | 25 |
| 3.4 | COMPUTER GRAPHICS | 3 | ~~ | 3 | 75 | 25 |
| 3.5 | DESIGN AND ANALYSIS OF ALGORITHMS | 3 | ~~ | 3 | 75 | 25 |
| 3.6 | LABORATORY (INTERNET, COMPUTER GRAPHICS) | ~~ | 10 | 3 | 75 | 25 |

**TOTAL MARKS 600**

**PAPER –3.1 MATHEMATICS – III**

**Unit I - Complex Variables:** **Marks: 25**

Limit, continuity, differentiability and analyticity of functions, Cauchy – Riemann equations, Laplace equations, Cauchy Integral formulae,

**Unit II - Advanced Topics:** **Marks: 30**

Infinite sequences and series of real and complex numbers – their convergence, improper integrals; Power series, radius of convergence, power series methods for solution of ordinary differential equations; Legendre equations and Legendre polynomials; Bessel equations and Bessel functions of first and second kind

**Unit III - Transform Calculus:** **Marks: 20**

Laplace transforms, inverse transform, shifting on the s and t axes;

**BOOKS:**


1. Kreyszig, E.; *Advance Engineering mathematics*; Wiley Eastern.
2. Spiegel; *Complex Variable*; Schaum Series
3. Malik, S.C.; *Mathematical Analysis;* Savita Arora

## PAPER –3.2 THEORY OF COMPUTING

**Unit I:** **Marks: 20**

**Regular Expression:** Introduction, Kleene closure, Formal definition, Algebra of regular expression, Regular languages

**Finite Automata:** finite automata, finite automata as output devices

**Unit II: Non-deterministic Finite Automata:** **Marks: 15**

Introduction to NFA, equivalence of NFA and DFA, pumping lemma, closure properties

**Unit III: Context Free Grammar:** **Marks: 20**

Grammar and its classification, CFG, Push down automata (PDA), Non context free languages (CFL), pumping lemma for CFL, Equivalence of CFG and PDA.

**Unit IV: Turing machine:** **Marks: 20**

Formal definition, Transition diagram, Construction of Turing Machine, language accepted and decided by Turing Machine, Chomsky Hierarchy.

**BOOKS:**


1. Lewis, H. R., Papadimitriou, C. H., *Elements of theory of computation*, PHI, 1996.
2. Hopcroft, J.D., Ullman; *Introduction to Automata theory, language and computation*, Addison Wesley.


## PAPER –3.3 INTERNET AND WEB PROGRAMMING TECHNOLOGIES

**Unit I: Introduction to Internet:** **Marks: 15**

Internet, growth of Internet, structure of Internet, Internet history of World Wide Web, basic Internet terminology.

**Unit II: Internet technology and protocol:** **Marks: 20**

Internet protocol: TCP/IP, SLIP, PPP

Network and network devices

Addressing in Internet - DNS, domain name and their organisation, understanding the Internet protocol address

Client-server concept- architecture and application

**Unit III: World Wide Web:** **Marks: 15**

Evolution of www, basic features, servers, http, URL, search engine, searching categories, hypertext.

**Unit IV: Browsers:** **Marks: 10**

Basic features, bookmarks, customisation of browsers, Netscape communicator and internet explorer.

E-mail, ftp, telnet

**Unit V: Interactivity tools** **Marks: 15**

HTML, ASP, VB- script, Java script

**BOOKS:**


1. Hain, Harley; *The Internet*, Prentice Hall.
2. Balaguruswamy, E.; *Programming with Java*, Tata McGraw Hill.

## PAPER –3.4 COMPUTER GRAPHICS

**Unit I: Introduction**: **Marks: 20**

Overview of graphics system: Video display devices, input devices, hard copy devices, graphics software

**Unit II: Output primitives:** **Marks: 20**

Points and lines, line drawing algorithms, circle and ellipse generating algorithms. Filled area primitives, attributes of output primitives

**Unit III:** **Marks: 20**

**Geometrical transformations:** Basic transformations, translations, rotation and scaling viewing and viewing functions

**Clipping operations:** Point clipping ,line clipping etc. Text clipping

**Unit IV:** **Marks: 15**

Introduction to computer animation and virtual reality.

**BOOKS:**

1. Hearn, D. and Baker, M. P., *Computer Graphics,* PHI, 1997.

## PAPER –3.5 DESIGN AND ANALYSIS OF ALGORITHMS

**Unit I: Basic algorithmic analysis:** **Marks: 25**

Asymptotic analysis of upper and average complexity bounds; best, average, and worst case behaviours; big-O, little-o, $\Omega$, and $\phi$ notation; standard complexity classes; empirical measurements of performance; time and space tradeoffs in algorithms; using recurrence relations to analyse recursive algorithms.

**Unit II: Fundamental algorithmic strategies**: **Marks: 20**

Brute-force; greedy; divide-and-conquer; backtracking; branch-and-bound; heuristics; pattern matching and string/text algorithms; numerical approximation

**Unit III: Fundamental data structure strategies:** **Marks: 20**

Implementation strategies for graphs and trees; performance issues for data structures

**Unit IV:** **Marks: 10**

Classes P, NP, Polynomials reducibility, NP-Completeness.

**BOOKS:**

1. Corman et al: *Introduction to algorithms;* McGraw Hill

## PAPER –3.6 LABORATORY BASED ON INTERNET, COMPUTER GRAPHICS

Unit I: Practical on Paper 3.3 Marks: 45

Unit II: Practical on Paper 3.4 Marks: 30

## FOURTH SEMESTER

| Paper No. | Subject | Theory (working hours/ week) | Programming Lab (working hours/week) | Duration of university exams (hours) | Maximum Marks | |
|---|---|---|---|---|---|---|
| | | | | | End semester | In semester |
| 4.1 | NUMERICAL ANALYSIS & SCIENTIFIC COMPUTING | 3 | ~~ | 3 | 75 | 25 |
| 4.2 | DATABASE MANAGEMENT SYSTEM | 3 | ~~ | 3 | 75 | 25 |
| 4.3 | OPERATING SYSTEM | 3 | ~~ | 3 | 75 | 25 |
| 4.4 | PROGRAMMING PARADIGM | 3 | ~~ | 3 | 75 | 25 |
| 4.5* | ENVIRONMENTAL STUDIES | 3 | ~~ | 3 | 75 | 25 |
| 4.6 | LABORATORY (FORTRAN, DBMS, OPERATING SYSTEM) | ~~ | 10 | 3 | 75 | 25 |

**TOTAL MARKS: 600**

* This Paper is common to all Under-Graduate courses and Grade will be awarded for this paper.

### PAPER –4.1 NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING

**Unit I - Overview:** **Marks: 15**

FORTRAN Language preliminaries; Floating-point representation of numbers with finite precision and its consequences, Concept of truncation and rounding-off errors, Stability, Consistency and Convergence

**Unit II - Roots of Equations:** **Marks: 15**

Iterative methods – bisection, false-position, Newton-Raphson; Solution of polynomial equations, Solution of Simultaneous Linear Equations – Gaussian elimination, pivoting

**Unit III - Curve Fitting and Interpolation:** **Marks: 15**

Method of least squares; Finite differences, Newton's interpolation formulae, Lagrange's formula for unequal intervals, Newton's divided difference formula

**Unit IV - Differentiation and Integration:** **Marks: 15**

Differentiation by polynomial fit, Integration by Newton's Quadrature formula – trapezoidal rule, Simpson's rules

**Unit V - Numerical Solution of Differential Equations:** **Marks: 15**

Solution by Taylor's Series, Euler's Method, Picard's Method, Runge-Kutta Method

**BOOKS:**


1. Grewal, B.S.; *Numerical Methods;*
2. Krishnamurthy, E.V. & Sen, S. K.; *Computer Based Numerical Algorithms;* East West Press
3. N. Oatta; *Computer Programming and Numerical Analysis*, University Press
4. Conte, S. D.; *Elementary Numerical Analysis*, McGraw Hill

**PAPER –4.2 DATABASE MANAGEMENT SYSTEM**

**Unit I: Databases and database users** **Marks: 10**

Database system concepts and architecture: data models, schemas and instances, DBMS architecture, database languages and interfaces, classification of DBMS

**Unit II:Data modelling using E-R model:** **Marks: 10**

E-R model concept

**Unit III: Record storage and primary file organisation:** **Marks: 15**

Introduction, secondary storage devices, buffering of blocks, operations on files, files of unordered record (heap files), files of ordered records (sorted files), hashing techniques
Index structures for files: single level ordered indexes, multilevel indexes; dynamic multilevel indexes using B trees and B+ trees

**Unit IV: Relational data models:** **Marks: 10**

Relational model concepts, relational model constraints, update operations on relations, defining relations
Relational algebra
Relational database languages: SQL

**Unit IV: Conventional data models:** **Marks: 10**

Network data model, hierarchical data model

**Unit V: Database design:** **Marks: 10**

Functional dependencies and normalisation for relational database

**Unit VI: Transaction processing concept:** **Marks: 10**

Introduction, transaction and system concept, properties, schedules and recoverability, serialability of schedules, Concurrency control, error recovery and security.

**BOOKS:**


1. Silberschatz, A., Korth, H.F., Sudarshan, S., *Database System Concepts, 3/e*, McGraw Hill (IE), 1997.
2. Ramakrishnan R., Gehrke J., *Database Management System, second edition*, McGraw-Hill (IE), 2000
3. Elmasri, R., Navathe, S. B., *Fundamentals of Database Systems*, Benjamin Cummings Publishing Company, 1994


**PAPER –4.3 OPERATING SYSTEM**)

**Unit I: Process Managemen**t: **Marks: 20**

Process, Thread, Scheduling Concurrency, Mutual Exclusion, Synchronisation, Semaphores, Deadlocks.

**Unit II:** **Marks: 20**

**Memory Management:** allocation, protection, hardware support, paging, segmentation.

**Virtual memory:** demand paging, allocation, replacement, swapping, segmentation, TBLs.

**Unit III: File systems:** **Marks: 15**

Allocation, free space management, directory management, mounting.

**Unit IV: I/O Management**: **Marks: 20**

Device drivers, Disk Scheduling, Block I/O; Characters I/O.
Use of Unix/Linux as a running example, examples from DOS, NT.

**BOOKS:**


1. Silberschatz, A., Galvin, P. B.; *Operating system Concepts, 5/e*, Addison-Wesley Publishing Company, 1998.
2. Deitel, H. M., *Operating System, 2/e* Addison-Wesley Publishing company 1990.
3. Stallings, W., *Operating systems, 2/e*, Prectice hall, 1995.

## PAPER –4.4 PROGRAMMING PARADIGM

**Unit I:** **Marks: 10**

Overview of the declarative style programming versus the imperative style.

**Unit II: Functional paradigm:** **Marks: 15**

Introduction to value-oriental programming in the functional style in the context of a language such as ml, local definitions and scope, block structure, principle of qualification.

**Unit III:** **Marks: 15**

Functions, principle of abstraction, call by name and call by value parameter passing mechanisms; principle of correspondence, recursive functions and their implementation, type checking, type constructions such as products, sums (tagged unions), function types (higher order functions), lists and user defined data types, parametric polymorphism (ml style) and simple programs using higher order functions, lists and other user defined types.

**Unit IV: Relational paradigm:** **Marks: 10**

Introduction to logic programming using a language such as PROLOG.

**Unit V: Imperative paradigm:** **Marks: 15**

Variable declarations and allocation of space, implementation of simple control constructs such as sequencing, conditionals and loops, block structure, parameter passing mechanisms (call by value, call by name), implementation of recursive procedures in a block structured language (call stacks and display records).

**Unit VI:** **Marks: 10**

**Object oriented paradigm:** data abstraction, classes, inheritance, dynamic, dispatch, derived classes, friend classes, virtual functions, operator overloading, templates.
**Object oriented design methodology**: object oriented software architecture; introduction to uml.

**BOOKS:**

1. Pratt, T. W. et al, *Programming Languages: Design & Implementation*, PHI

## PAPER –4.5 ENVIRONMENTAL STUDIES

**(FOR ALL UNDER GRADUATE COURSES OF DIBRUGARH UNIVERSITY)**
(Grade will be awarded for this paper)

(Approved by the 81st meeting of the Under Graduate Board of Dibrugarh University held on 03.08.2004 giving immediate effect)

**Internal: 10 End Semester: 90**

**Unit I: The Multidisciplinary nature of environmental studies** **Total lectures – 2**
**Marks – 5**

Definition, scope and importance
Need for public awareness

**Unit II: Natural Resources:** **Total lectures –12**
**Marks – 20**

.

**Renewable and non- renewable resources:**
**Natural resources and associated problems.**

a) Forest resources: use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources: use and over -utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
c) Mineral resources: use and exploitation, environmental effects of extraction and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer- pesticide problems, water logging , salinity.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
f) Land resource: land as a resource, land degradation, man-induced landslides, soil erosion and desertification.

- Role of and individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**Unit III: Ecosystems** **Total lectures – 10**
**Marks – 15**

- Concept of and ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:
  a. Forest ecosystem
  b. Grassland ecosystem
  c. Desert ecosystem
  d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Unit IV: Biodiversity and its Conservation** **Total lectures – 10**
**Marks –15**

- Introduction- Definition; genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and option values
- Hot-spots of biodiversity - India.
- Threats to biodiversity; habits loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species.
- Conservation of biodiversity; In-situ Ex-situ conservation of biodiversity.

**Unit V: Environmental Pollution** **Total lectures – 10**
**Marks – 15**

**Definition**

- Causes, effects and control measures of:
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Noise pollution
  e. Thermal pollution
  f. Nuclear hazards
- Solid waste Management: Causes, effects and control measures of urban and industrial wastes- biodegradable and non biodegradable wastes.
- Role of an individual in prevention of pollution.
- Disaster management: Floods, earthquake, cyclone and landslides.

**Unit VI: Social Issues and the Environment** **Total lectures – 10**
**Marks – 12**

- From Unsustainable to Sustainable development.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people: its problems and concerns.
- Environmental ethics.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
- Wasteland reclamation.
- Consumerism and waste products.

- Environmental Legislation.
- Public awareness.

**Unit VII: Human Population and the Environment** **Total lectures – 8**
**Marks – 8**

- Population growth, variation among nations.
- Population explosion- Family Welfare Programme.
- Environment and human health and hygiene(including Sanitation and HIV/AIDS) etc.
- Role of Information Technology in Environment and Human Health.

**Unit VIII: Field work** **Total lectures – 5**
**Marks – 10**

- Visit to a local area to document environmental asset-river/forest/grassland/hill/mountain.
  * Visit to a local polluted site- Urban/Rural/Industrial/Agricultural.
- Study of common plants, , insects, birds and fishes.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours).

**REFERENCES:**


1. Agarwal, K.C.2001 *Environmental Biology*, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, *The Biodiversity of India*, Mapin Publishing Pvt. Ltd., Ahmedabad-380013, India Email: mapin @icenet.net ( R ).
3. Brunner R.C., 1989, *Hazardous Waste Incineration*, McGraw Hill Inc.480p.
4. Clark R.S., *Marine Pollution*, Clanderson Press Oxford (TB).
5. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworht, M.T. 2001, *Environmental Encyclopedia*, Jacio Publ. House, Mumbair, 1196p.
6. De A.K., *Environmental Chemistry*, Eiley Eastern Ltd.
7. *Down to Earth, Centre for Science and Environment* ( R ).
8. Gleick, H.P. 1993. *Water in crisis*, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press 473p.
9. Hawkins R.E. *Encyclopedia of Indian Natural History*, Bombay Natural History Society, Bombay ( R ).
10. Heywood, V.H. & Watson, R.T. 1995. *Global Biodiversity Assessment*. Cambridge Univ. Press 1140p.
11. Jadav, H & Bhosale, V.M. 1995. *Environmental Protection and Laws*; Himalaya Pub. House, Delhi 284p.
12. Mckinney, M.L. & Schooh, R.M. 1996. *Environmental Science systems & Solutions*, Web enhanced edition. 639p.
13. Mhaskar A.K., *Matter haxardous*, Techno-Science Publications (TB).
14. Miller T.G. Jr., *Environmental Science*, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971. *Fundamental of Ecology*. W.B. Saunders Co. USA, 574p.
16. Roa M.N.& Datta, A.K. 1987. *Waste Water treatment*. Oxford & IBH Publ. Co.Pvt. Ltd. 345p.
17. Sharma B.K., 2001. *Environmental Chemistry*. Goel Publ.. House, Meerut.
18. *Survey of the Environment*, the Hindu ( M ).
19. Townsend C., Harper J, and Michael Begon, *Essentials of Ecology*, Blackwell Science


## PAPER – 4.6 LABORATORY BASED ON FORTRAN, DBMS, OPERATING SYSTEM

Unit I: Practical on Paper 4.1 Marks: 10
Unit II: Practical on Paper 4.2 Marks: 40
Unit III: Practical on Paper 4.3 Marks: 25

Including Shell Programming, installation of Operating System.

**FIFTH SEMESTER**

| Paper No. | Subject | Theory (working hours/ week) | Programming Lab (working hours/week) | Duration of university exams (hours) | Maximum Marks | |
|---|---|---|---|---|---|---|
| | | | | | End semester | In semester |
| 5.1 | DATA COMMUNICATION AND COMPUTER NETWORKS | 3 | ~~ | 3 | 75 | 25 |
| 5.2 | OPERATION RESEARCH | 3 | ~~ | 3 | 75 | 25 |
| 5.3 | SOFTWARE ENGINEERING | 3 | ~~ | 3 | 75 | 25 |
| 5.4 | MINOR PROJECT | | | | Total Marks: 200 | |
| 5.5 | LABORATORY (NETWORKING AND SOFTWARE ENGINEERING) | | 10 | 3 | 75 | 25 |

**TOTAL MARKS: 600**

**PAPER –5.1 DATA COMMUNICATION AND COMPUTER NETWORKS**

**Unit 1:** **Marks: 7.5**

Introduction, mathematical basis of data communication, analog and digital transmission, parallel and serial communication,

**Unit II:** **Marks: 7.5**

Asynchronous and synchronous communication, multiplexing and demultiplexing.

**Unit III:** **Marks: 7.5**

Detection and correction of transmission errors, data compression and Encryption

**Unit IV:** **Marks: 7.5**

Introduction to computer networks, types of networks, network topologies

**Unit V:** **Marks: 7.5**

Network reference models, OSI reference model, TCP/IP reference model

**Unit VI:** **Marks: 7.5**

Physical layer, transmission media, guided and unguided media, repeaters hubs

**Unit VII:** **Marks: 7.5**

Data link layer, flow control, access protocols, bridges and switches

**Unit VIII:** **Marks: 7.5**

Network layer, routing protocols, Internet protocol, IP addresses, sub-netting

**Unit IX:** **Marks: 7.5**

Network layer, transmission control protocol, user datagram protocol

**Unit X:** **Marks: 7.5**

Session layer, presentation layer and application layer, FTP, telnet HTTP, the Internet

**BOOKS:**


1. Stallings, W., *Data and computer communications, 4th Edition;* PHI,1996.
2. Ramteke, T., *Networks*, Prentice Hall Carrier & Technology, 1994.
3. Tanenbaum, A. S., *Computer Networks, 3rd edition*, PHI, 1995.

## Paper –5.2 OPERATION RESEARCH

**Unit – I: Model Formulation:** **Marks: 10**

Introduction, Structure and assumption of an Linear Programming problem (LP), General mathematical model of linear programming problem.

**Unit – II: Graphical solution method:** **Marks: 15**

Introduction, Definitions, graphical solution method of an LP problem, multiple optimal solution, unbounded solution, infeasible solution.

**Unit – III: Simplex method:** **Marks: 15**

Introduction, standard from of LP problem, simplex algorithm (maximisation case), Simple Algorithm (Minimization case), multiple optimal solution, Unbounded Solution

**Unit – IV: Duality:** **Marks: 10**

Introduction, Formulation of dual linear problem, standard results on duality, advantage of duality.

**Unit – V: Transportation problem:** **Marks: 15**

Introduction, Loops in transportation table and their properties, the transportation method, Linear programming formulation of the transportation problem, north west corner method for finding initial solution, Least cost method for finding initial solution. Vogel's approximation method for finding initial solution.

**Unit – VI: Test of optimality:** **Marks: 10**

Dual of transportation model, economic interpolation of U S and V S, step of MODI method.

**BOOKS:**


1. Sharma, J. K., *Operation Research – Theory and Application*, MacMillan India Ltd. New Delhi, 1997.
2. Hadley, G., *Linear Programming*, Narosa Publishing House, New Delhi
3. Bronson, Richard, *Operation Research*, McGraw Hill


## PAPER –5.3 SOFTWARE ENGINEERING

**Unit I: Introduction to software engineering:** **Marks: 20**

Concept of a software project, size factor, quality and productivity factor different phases of Software development life cycle.

**Unit II:** **Marks: 20**

**Software project management**: planning, scheduling, monitoring, controlling etc. requirement specifications

**Software design**: function oriented , object oriented approaches, user interfaces.

**Software programming**: Structured coding techniques, coding styles, standard.

**Unit III:** **Marks: 20**

**Software verification and validation**: theoretical foundation, black box and white box approaches, integration and system testing

**Software reliability**: definition and concept of reliability, software faults, errors, repair and availability.

**Unit IV:** **Marks: 15**

CASE studies

**BOOKS:** Jalote, P., *An Integrated approach to software engineering*, Narosa Publishing House, 1999.

**REFERENCE BOOKS:**


1. Pressman, R. S., *Software Engineering: A practical Approach*; McGraw-Hill, 1997.
2. Humphery, W. S., *Managing software Procedures*, Addission-Wesley, 1989


**PAPER – 5.4 MINOR PROJECT** **Total Marks: 200**

**PAPER – 5.5 LABORATORY BASED ON NETWORKING AND SOFTWARE ENGINEERING**

| | |
|---|---|
| Unit I – Practical on Paper 5.1 | Marks: 45 |
| Unit II – Practical on Paper 5.3 | Marks: 30 |

## SIXTH SEMESTER

| Paper No. | Subject | Theory (working hours/ week) | Programming Lab (working hours/week) | Duration of university exams (hours) | Maximum Marks | |
|---|---|---|---|---|---|---|
| | | | | | End semester | In semester |
| 6.1 | ETHICS IN INFORMATION TECHNOLOGY | 3 | ~~ | 3 | 75 | 25 |
| 6.2 | SYSTEM SOFTWARE | 3 | ~~ | 3 | 75 | 25 |
| 6.3 | MAJOR PROJECT | | | | Total Marks: 300 | |
| 6.4 | LABORATORY (SYSTEM SOFTWARE) | | | | 75 | 25 |

TOTAL MARKS: 600

## PAPER –6.1 ETHICS IN INFORMATION TECHNOLOGY

**Unit I:**

Meaning of Ethics, objectives, nature and source of Ethics. Types of Ethics. Ethics vs. Morals and Values. Functions of Ethics.

**Unit II:**

Values, Norms, Beliefs, Moral Standards, Beliefs and their role, Morality, Moral standards, Beliefs and their role, Ethical *codes*.

**Unit III:**

Managing Ethics, Ethical Activities, Key Organisational and Program design, Factors Associated with Ethics Comptiance, Code of Ethics, Lows Enforcing Ethical Conduct.

**Unit IV:**

Ethical issues in IT, Security threats, Attacks on Computer Systems, Computer Viruses, Software packages, Computer Crime Prevention, Internet crime and Computer Abuse, Main Moral dimensions of our Information Society, Whistle Blowing.

**Unit V:**

Professional Ethics for IT, Code of Ethics, Conduct and practices, IEEE etc. Ethics at work place.

**BOOKS:**

1. Murthy, C. S. V.; *Business Ethics;* Himalya Publishing House, Delhi.
2. Suresh, Jayshree & Raghavan, B. S.; *Professional Ethics*; S. Chand & Company

## PAPER –6.2 SYSTEM SOFTWARE

**Unit I: Overview:** **Marks: 15**

Definition and classification of system software.

**Unit II: Assembler:** **Marks: 20**

Assembly language, assembly process, assembler data structures, assembler macros and microprocessors.

**Unit III: Linkers and loaders:** **Marks: 20**

Basic concepts, static and dynamic linking, shared libraries, loaders, overlays.

**Unit IV: Compilers:** **Marks: 20**

Introduction and phases of a compiler: Lexical Analysis, parsing & intermediate code generation

**BOOKS:**


1. Aho, Ullman, Sethi, *Compiler Design*,
2. Dhamdhere, *System Programming & Operating system*, Tata Mc Graw Hill


## PAPER – 6.3 MAJOR PROJECT

Major Project Marks: 300

## PAPER –6.4 LABORATORY BASED ON SYSTEM SOFTWARE

Unit I – Practical on Paper 6.2 Marks: 75

## BCA PREPARATORY MATHEMATICS

(For candidates who were unsuccessful in Mathematics at H. S. Examination)
(No formal classes will be held for this paper)
Marks :100 Pass Marks: 30

**Unit I: Sets, Functions and Graphs:** **Marks 10**

Sets, Inclusion and equality, Universal set & Venn Operations on sets.

Functions, Types of Functions.

Graphs of functions, Plotting Graphs of Same standard functions, Use of Graphs.

**Unit II: Algebra** **Marks 40**

**Number system:** Development, properties, Decimal representation of real numbers, geometrical representation of real numbers.

**Exponents and Logarithms:** Exponents, positive and negative integral exponent, Laws of exponents, rational exponents. Laws of logarithms, common logarithms, Anti logarithms, using log tables.

**Sequence and series:** Sequence, Series, Arithmetic Progression, Geometric Progression.

**Permutations & Combinations:** Permutations, combinations, Binomial Theorem , Pascal's Triangle .

**Matrix and Determinants:** Matrix, Types of matrices, Elementary matrix operations, Determinant, Cramer's Rule, Quadratic equations.

**Unit III: Coordinate Geometry Of Two Dimension And Trigonometry**

**Marks: 10+10 = 20**

**Coordinate Geometry of Two-Dimension:** Coordinates, Straight lines, Circle, Parabola, ellipse, hyperbola.

**Trigonometry:** Trigonometric ratios (acute angles) Trigonometric Identities.

**Unit IV: Calculus And Statistics** **Marks: 15+15 = 30**

**Calculus:** Limits, continuity, Differentiation, Integration.

**Statistics:** Collection of data, organising the Data, Frequency distribution Measure of Central Tendency, Measures of Dispersion, Simple Correction Regression.

**Probability:** Definition of Mutually exclusive events, probability of mutually exclusive events, joint probability.