B.C.A
(BACHELOR OF COMPUTER APPLICATION)

GAUHATI UNIVERSITY

REVISED PROGRAM STRUCTURE AND DETAILED CURRICULUM
IN THE L-T-P-C FORMAT

YEAR 2011

GAUHATI UNIVERSITY
BCA (Bachelor of Computer Application)
Year 2011

The course will be a 3 year - 6 semester course.

Eligibility: Higher Secondary with Mathematics as one of the subjects at the Higher Secondary level. However the Colleges may have their own cut-off marks which they seem to be reasonable for them and/or hold admission test for the final selection of candidates. Students who not from H.S. Science stream will have to take up a bridge course in addition to the normal courses in the 1st semester.

Examination: Examination for the bridge course will be conducted by the Colleges and in order to clear the 1st semester a student will have to obtain minimum pass mark in this paper. However the mark obtained in this paper will not be counted in calculating his/her semester grade point average (GPA). Similarly mark obtained by a student in paper 2.6 Environmental Studies will not be counted in his/her semester grade point average (GPA), but he/she will have to obtain the minimum pass mark in this paper in order to clear the second semester.

The **L-T-P-C** break- up for the courses has been mentioned below with each course. Each paper will carry a total of 6 credits except the course 6.4 project work which will carry 12 credits. For the theory papers, 1 credit point corresponds to one lecture / tutorial per week and for practical papers 1 credit point corresponds to 1 practical session (of at least 2 hours) per week.

All matters related to examinations including internal evaluations will be as per the regulation of TDC for semester system of G.U. with choice based credit and grading system.

Course break-up

Total mark assigned for each full paper is 100 and for the project work (course 6.4) it is 200.

SEMESTER-I

1.1. Introduction to Computer Fundamentals and Programming.(5-1-0-6)
1.2. Communicative English.(4-2-0-6)
1.3. Basic Electronics (5-1-0-6)
1.4. Mathematics – I (5-1-0-6)
1.5. Laboratory (0-0-6-6)
1.6. Bridge course (for students coming from other than the Science stream)

SEMESTER -II

2.1. Data Structure and Algorithm (5-1-0-6)
2.2. Computer Based Accounting and Financial Management. (5-1-0-6)
2.3. Mathematics – II (5-1-0-6)
2.4. ICT Hardware (4-2-0-6)
2.5. Laboratory (0-0-6-6)
2.6. Environmental Studies

SEMESTER-III

3.1. Operating System (5-1-0-6)
3.2. Computer Organization and Architecture. (5-1-0-6)
3.3. Database Management System. (5-1-0-6)
3.4. Object Oriented Programming (5-1-0-6)
3.5. Laboratory (0-0-6-6)

SEMESTER- IV

4.1. Microprocessor and Assembly Language Programming. (5-1-0-6)
4.2. Software Engineering (5-1-0-6)
4.3. Programming in Java (5-1-0-6)
4.4. Automata Theory and Languages (5-1-0-6)
4.5. Laboratory (0-0-6-6)

SEMESTER-V

5.1.   Management Information System (5-1-0-6)
5.2.   Web Technology (5-1-0-6)
5.3.   Computer Networks. (5-1-0-6)
5.4.   Computer Oriented Numerical Methods and Statistical techniques (5-1-0-6)
5.5.   Laboratory ((0-0-6-6)

SEMESTER VI

6.1.   Elective – I
6.2.   Elective – II
6.3.   System Administration using Linux (2-1-3-6)
6.4.   Project Work (0-0-6-12)

Courses for Elective I

6.1.1. Queuing Theory and Optimization (5-1-0-6)
6.1.2. Data Warehousing and Data Mining (5-1-0-6)
6.1.3. GUI Programming (2-1-3-6)

Courses for Elective II

6.2.1. Computer Graphics (5-1-0-6)
6.2.2. Database Design and Programming (2-1-3-6)
6.2.3. Compiler Design (5-1-0-6)

Minimum requirement for starting BCA course under Gauhati University by any College / Institute

Minimum Laboratory Requirement

Ratio of number of Student and number of Computer Systems at the time of conducting practical classes should be 1:1.

Laboratory Components	Quantity
1. Resistors : All values at ¼ watt	100 each
2. Digital Multimeter: (Volt ac/dc, current ac/dc, Ohmmeter)	15
3. Power Supply: (30 Volt variable and 2 Amp, single rail)	15
4. Breadboard, Hookup wire, Stripper, Soldering Iron, Screw driver, Hammer, Hach saw(small), knife	15 each
5. Diode (1N 4004)	100
6. Transistor (2N 3004, 2N3055, BC547, BC548, BC549, SL100, SK100)	100
7. CRO (33 MHz duel channel)	10
8. Function Generator (3 MHz Sinewave/triangular/square)	15
9. BNC to BNC and BNC to Crocodile probe	5
10. Capacitor (all value ceramic electrolytic 10 μF,100μF, 1000μF)	100 / 25 each
11. Inductor (10mH, 25 mH, 5mH,10μH,1H, 5H,10H)	25 each
12. LED (below 5Volt rating) 3 sizes	100 each
13. Transformer (12 volt/ 15 volt/20volt)	20
14 Digital Gate (7400,7404,7406, 7408,7432,7486)	30 each
15. Computer System:	15

Operating System: Linux and Windows

16. 8085 Microprocessor Kit	10

The above requirement is for 30 students.

The Computer Laboratory will have to be well equipped with Networking (LAN) done and with proper power back up and cooling systems. The students should get regular access to the Internet.

Minimum number of teachers in the subject

At least 4 regular / full time teachers having PG degree in the subject (Computer Science/IT/Computer Application /Computer Engineering) should be available at the time when all the three semesters are simultaneously running. The teachers should be fully dedicated for the BCA program only. Guest and/or part time teachers may be appointed for teaching courses like Mathematics, Electronics and English Language etc. Such teachers having PG degree in the concerned field may be appointed from within the same institution or from other institutions.

Other requirements

At least one Office Staff and one Laboratory Supervisor/Assistant with appropriate technical qualification have to be appointed for the course.

DETAILED SYLLABUS

1.1 INTRODUCTION TO COMPUTER FUNDAMENTALS AND PROGRAMMING

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Fundamentals   **Marks :25**

Major components of a Digital Computer (A brief introduction of CPU, Main memory, Secondary memory devices and I/O devices) Keyboard, monitor, mouse, printers, Secondary storage devices (floppy disks, hard disks and optical disks), backup system and why it is needed ? Bootstrapping a Computer. Representation of numbers (only a brief introduction to be given) and characters in computer. ASCII. EDCDIC and Gray codes. Interpreter, Assembler, Linker and Loader. Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.

Number System: Binary, Hexadecimal, Octal, BCD, and conversions of number systems. Representation of signed integers, Sign and magnitude, 1's complement and 2's complement representation. Arithmetic operations using 2's complement representation and conditions for overflow/underflow and its detection.

Introduction to C: **Marks : 30**

Elementary data types , variables, constants and identifiers. Integer, character floating point and string constants . variable declarations. Syntax and semantics. Reserved word. Initialization of variable during declarations Constant data types. Expression in C, precedence and associativity of C operators, unary, binary and ternary operators. C arithmetic operators, assignment operators, relational operators, logical operators and bit –wise operators . L-value and R-value. Side effects of operators. Expression statement.
Conditional Statement-if, if-else, switch
Iterative Statement-white, do-while, for
Other Statement –break , continue, goto, return, null Statement, block Statement. Function: function declaration. Calling a function. Parameters –Call by value, Call by reference and its absence in C. Recursion and how it works.
Cast and sizeof operator. Automatic type Conversion.
Simple programs like programs to compute an arithmetic expression, unit conversion, the sum of a series (like trigonometric series), GCD, factorial (both recursive and non-recursive version), fibonacci number (both recursive and non-recursive version), generation of prime numbers, reversing digits of an integer, finding the square root of a number, prime factors of an integer, base conversion of numbers, test if three points form a

triangle and classify triangles as right angled, isosceles, equilateral etc., roots of a quadratic equation, generation of simple patterns of characters on screen.

Arrays and pointers: **Marks : 15**

Storage classes : Automatic, External, Static, Register. Scope and lifetime of variables.
Arrays and pointers and corresponding operators. Pointer arithmetic.
Programs using arrays and pointers like sum, average, minimum, maximum of an array of numbers. Add and delete an element of an array. Merge two sorted arrays. String manipulation programs like addition, subtraction, multiplication and their combinations. Sum of rows, columns, and diagonal elements of a matrix. Transpose of a matrix. Linear search, binary search. Selection sort and bubble sort.

Structures and Files: **Marks 10**

Structure – declaration and use. Structure member resolution and structure pointer member resolution operators. Programs to show the use of structure.
Standard C library. Files in C—opening, closing, reading and writing of files. Seeking forward and backward. Simple examples of file handling programs.

Suggested Reading:
1. Programming with C, B.S. Gottfried, Tata Mc-Graw Hill.
2. Programming in ANSI C, E.Balagurusamy, Tata McGraw – Hill
3. The C Programming Language, B.W. Kernighan and D.M.Ritchie, PHI
4. Computer Fundamentals, Anita Goel, Pearson, 2010.

1.2 COMMUNICATIVE ENGLISH

Total Marks: 100 (Semester end examination - 60, Personal Interview - 20, Internal assessment (home assignment and group discussion)- 20)
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      Communicative English plays a pivotal role in equipping the learners with all basic skills and enables them to use English language in all their real life contexts. The objective of this course is to prepare the students for the competitive world of 'job market" with a reasonable fluency in spoken English and with flair knowledge of written communication. The course also aims to offer a broad outline of the different skills of Communicative English with practical know how, and is intended to impart the various skills on listening, speaking, reading and writing   and on various types of written, oral and business communication .The course is intended to shed the communication barriers of the students/ people aspiring to get absorbed in the field of science and technology, computer science, business organizations, corporate sectors, civil and aviation sector, public administration and other government and private sectors, front-desk services and other relevant fields.

      While classroom lectures will focus on the theoretical aspects of the contents of the different units, the practice sessions will give demonstrations of the skills involved.
      The course is divided into two sections:

Section I
      Section-I will have 5 units carrying 60 marks. Students will be required to answer compulsory questions from Unit I, Unit II & Unit III. Unit IV and V are optional and students will be required to answer question from any one of them.

Concept and fundamentals of communication skills   1**5 marks**
Scope and Meaning of communication; essentials of good communication- listening and reading skills, verbal and non verbal communications, gestures and body language, formal and informal communication; levels of communication -upward /downward /horizontal communication, barriers of communication

Oral communication   **15 marks**
      Mechanisms of effective oral communication- how to speak a language clearly, fluently and naturally; pronunciation – stress and intonation; everyday conversation and chat; group discussion and interviews; public speaking.

Written communication   **15 marks**
Mechanisms of effective written communication – punctuation, sequencing of ideas, building paragraph/body, a good introduction and conclusion; word buildings; writing letters for different occasions; report/ summary/ gist writing etc.

Business communication in English   **15 marks**
Extensive oral and written examples of various kind of Business communication

English in the field of science & technology   **15 marks**

Extensive oral and written examples of various kinds of English used in the field of science and technology

Section II

Section -II will have 2 units carrying 20 marks.

Personal Interview   **20 marks**

An external expert appointed by the University, the head of the concerned department and the course in-charge of the institution will constitute an expert panel and students will be required to appear before them for viva voce to give evidence of their acquired communicative skills.

Home assignment and group discussion   **20 marks**

Home assignments and group discussion will have to be arranged by the teacher in charge of the course and from properly maintained records of such assignments and group discussion, one internal committee formed by the HOD of the CS/IT/CA department of the College concerned will finalize the marks.

Suggested reading:
1. Strengthen your Writing: V. R. Narayanaswami (Orient Longman)
2. Everyday Dialogues in English: Robert J. Dixon (Prentice Hall of India)
3. Spoken English: V. Sasikumar & P. V. Dhamija (Tata McGraw-Hill Publishing Ltd.)
4. C. S. Communication: Rayudu (Himalaya Publishing House)
5. Oxford Advanced Learner's Dictionary
           Or
   Cambridge Advanced Learner's Dictionary
            Or
    Longman's Contemporary English Dictionary

1.3 BASIC ELECTRONICS

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Marks 10

Basic principles of Electricity and Electrical Circuits: Ohm's law, Kirchoffs Law, Norton and Thevenin's theorems, temperature coefficient, specific resistance of materials. Basic equation of capacitor, Relationship between current, charge, voltage, permittivity, parallel plate capacitor, its equation. Basic Equation of inductor, Relationship among voltage, current and field.

Marks 10

Conductors, Insulators, and Semiconductors. Intrinsic and Extrinsic semiconductors, P-type, N-type Semiconductors. Junction Diode. Biasing. V_I Characteristics. Other Semiconductor Devices: Zener Diode, Photo Diode, Varactor, SCR, LED, LDR,

(10)

Marks 15

Bipolar Transistor: PNP and NPN, photo transistor. CC, CE, CB configurations. Biasing of transistors. V-I relations, Load Line. FET and MOSFET. Op-Amps & Integrated Circuits.

Marks 10

Power rectifier and filter: Rectifier, filter. Working of a simple power supply using transformer, rectifier and filter.

Marks 15

Boolean Algebra and Logic Gates: De Morgan's theorem, Boolean Identity. OR, AND, NOT, NAND, NOR and Ex OR gates. Truth Tables. Positive and Negative logic.

Marks 15

Reduction Techniques: Standard representation of Boolean expressions, SOP and POS forms, Combinational and sequential circuits, Minterm and Maxterm expressions, Map reduction techniques, K-Map. Code Conversions: Binary to Gray, BCD to decimal etc.

Marks 15

Binary Arithmetic: Half Adder, Full Adder. Multiplexer, Demultiplexer, Decoder, Encoders, Comparators. Flip Flops: S/R, J/K, D and T. Latches, Digital Counters. Registers.

Books:
1. Digital Logic and Computer Design, M. M. Mano, PHI
2. Electronics Devices and Circuits: Millman and Halkias; Tata Mc Graw Hill.
3. Digital Computer Electronics: Malvino; Tata Mc Graw Hill.
4. Digital Techniques: P.H. Talukdar; N.L. Publications

1.4 MATHEMATICS-I

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Sequence and Series   **15 Marks**
Sequence of real numbers, bounded, convergent and non-convergent sequences. Uniqueness of the limit and bounds of a convergent sequence. Cauchy sequence, Cauchy's general principle of convergence (proof of the necessary part only). Subsequences, convergence and divergence of monotonic sequences. Algebraic operations on limit (statements of the theorems without proof). Infinite series, statements of basic properties of infinite series (without proof). Absolute and conditional convergence. Tests for convergence: Comparison test, Ratio test.

Trigonometry   **15 Marks**
Geometrical representation of complex numbers- the Argand plane. Polar form of a complex number. Modulus, amplitude and their various properties. De Moiver's theorem. Expansion of $\cos(x)$ and $\sin(x)$ in positive integral powers of x.

Abstract Algebra   **25 Marks**
Group Theory: Definition and examples of groups. Permutation group and Cyclic group. Subgroups and Cosets. Lagrange's theorem on the order of a subgroup of a finite group. Normal subgroups. Quotient groups.
Ring Theory : Definition and examples. Simple properties of Rings.

Calculus   **15 Marks**
Roll's theorem, Lagrange's Mean Value theorem and Taylor's theorem. Meaning of the sign of derivative. Indeterminate forms, maxima and minima (single variable).

Differential Equations   **10 marks**
Differential equations of first order and first degree, solution by variable separable methods. Homogeneous equations; Linear equations and equations reducible to linear forms. Exact differential equations.

Suggested Readings:
1.   Higher Algebra (Classical); S. K. Mapa; Ashok Prakashan, Kolkata.
2.   Higher Trigonometry; Das and Mukherjee; U. N. Dhur and Sons.
3.   A course in Abstract Algebra; V. K. Khanna & S.K.Bhambri; Vikas Pub House, Pvt Ltd, New Delhi.
4.   Modern Algebra; S. Singh and Q. Zameerruddin; Vikas Pub House, Pvt Ltd, New Delhi.
5.   Differential Equations; Piaggio.
6.   Ordinary Differential Equation; B. C. Deka.

1.5 LABORATORY

At least 20 practical assignments covering paper 1.1 (50 marks) and 15 practical assignments covering paper 1.3 (50 marks) should be done by the students from the list prepared by the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered.

1.6 BRIDGE COURSE

Total Marks: 100

General Physics   **Marks: 25**

Fundamental quantities in Physics (mass, length, time and charge), CGS and MKS (SI international system of units)

Displacement, speed, velocity, acceleration and retardation, force.

Concept of work, energy and power, their units, kinetic and potential energy, Law of conservation of energy.

Wave and propagation of waves in material medium, Concept of wavelength. , velocity, frequency and phase of wave.

Law of reflection and refraction, total reflection.

Electricity at Rest (Statical Electricity)   **Marks: 15**

Atomic structure(elementary idea), electron –primary charge carrier , Coulomb's law, Dielectric constant, Relationship between charge and Dielectric Constant Electro-static field, Electric Intensity, Electric potential ,Potential Difference

Electricity at Motion (Current Electricity)   **Marks: 15**

Electric current as rate of flow of charge in electric field, ampere, free electron in metals , conventional current ,Potential difference ,conductor and insulator ,resistance, specific resistance, permeability , permittivity, Ohm's law.

Resistance in Series and parallel, Dry cell.

Electro Magnetic Induction: **Marks: 10**

Magnetic flux, Faraday's Laws of electromagnetic induction, Self induction, Mutual induction, induction coil, A.C Current, Inductance and Capacitance, Transformer

Elements of Electronics   **Marks: 25**

Thermoionic Emission, Vacuum tube, Concept of Diode and Triode

Semi Conductors, Doping, N-type and P-type Semiconductors, Junction diode, Forward Biasing, Reverse Biasing.

Transistor, Characteristics of transistor

General Chemistry   **Marks :10**

Elements, Atom , molecule ,Periodic Table

Suggested Readings:

Modern Approach to Physics by Dr. Dilip Sarma (Part I & Part II)

2.1 DATA STRUCTURE AND ALGORITHM

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Definition :   **Marks : 8**
Concept of Data Types, elementary structure, words and their interpretations, packed words
Arrays :
Types, memory representation, address translation functions for one & two dimensional arrays, different examples.

Linked Structure: **Marks : 15**
Singly and doubly linked list, circular and non circular, list manipulation with pointers , example involving insertion and deletion of elements and their comparative studies with implementations using array structure

Stacks and Queues
Definitions, representation using array and linked list structure, application of stack and queues in simulation, postfix conversion and evolution of arithmetic expressions

Binary Trees: **Marks:17**
Definition, quantitative properties, memory representation, Trees traversal algorithms (recursive and non-recursive), threaded trees, BFS, DFS

Searching :   **Marks : 10**
Linear and binary search algorithms, performance and complexity, binary search trees (construction ,insertion , deletion and search) Concept of optimal binary search trees.

Sorting: **Marks : 15**
Terminology, performance evaluation, sorting algorithms (non recursive, recursive description, Complexity, advantages and disadvantage, implementation)
Bubble sort, insertion sort, selection sort, Tree sort, heap sort, quick sort, merge sort & radix sort. External Sorting.

Analysis of Algorithm

                                                                                                             Marks: 15
Time and Space complexity of algorithms, average case and worst case analysis, asymptotic notation as a measure of algorithm complexity, O and θ notations. Analysis of sorting algorithms- Selection sort, Bubble sort, Insertion sort, Heap sort, Quick sort and analysis of searching algorithms – linear search and binary search.

Suggested Readings:
1. Data Structure , Horowitz and Sahani, Narosa
2. Introduction to Data Structures in C, A.N.Kamthane, Pearson, 2007.
3. Data Structure using C and C++, Langsam**,** Augentein & Tanenbaum, PHI
4. Data Structures using C, S.K.Bandyopadhyay, K.N.Dey, Pearson.

2.2 COMPUTER BASED ACCOUNTING AND FINANCIAL MANAGEMENT

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Part : I Accounting   **Marks: 30**

- Introduction - Definition, function, objective, need, advantage, events and transaction, double entry system of book keeping.
- Books of accounts - classification of books of accounts, meaning of journal, journalizing of transactions, ledger and ledger posting, closing of books of accounts and preparation of trial balance.
- Cash book - single column, double column and triple column; depreciation.
- Financial statements - Trading, Profit and Loss Account and Balance Sheet.
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Part: II   **Marks: 25**
1. Introduction – Versions of Tally, Features of Tally, ERP Features, Data Directory, and Tally switching between screen areas.
2. Company creation:-Create/ Alter/Select/Close/Delete.
   Introduction on F11 features & F12 configuration.
3. Basic Accounting: - Accounting Info Ledger/Group (Single & Multiple) Create/Display/Alter/Delete.
4. Accounting Voucher:- Types of Voucher, Configuring Voucher, Voucher Creation, Entering/Altering & Deleting.
5. Basic of Tally Inventory:-"Integrated A/c with Inventory"
   Create/Display/Alter/(Single & Multiple) : Group, Category, Godown, Units (Simple/Compound)
6. Invoicing :-Purchase & Sales in Invoice format, Debit Credit notes/Discount/Description
7. Inventory Voucher

Part: III   **Marks : 25**

Advance Accounting
1. Bill wise Details – Transaction wise Bill By Bill for trading & non trading organization
2. Interest Calculation – Simple & Advance parameters Interest calculation on outstanding Balances, use of vouchers class ,Adjustment entries
3. BRS- Simple & Advanced
4. Multiple Currencies – Create of different currencies, voucher entries ,Adjustment entries on forex gain / loss

5. Cost Center & Cost Categories – (By using purchase, Sales, Receipt, Payment voucher) Create / Alter / Display.
6. Advance Inventory- Actual/Different Billed Qty, O' Value, Batch wise, Alternate Units, BOM, Price List
7. Budget & Control – Create / Alter, Budget for group / ledger / cost Center.
8. Scenario Mgt – Create / Alter / Delete. Transactions

Printing, Housekeeping & Administration
9. Administration – Security control, Tally Audit.
10. Housekeeping – Group company, Split company Export Data, ODBC.
11. Printing – Company printing option, Setting to a Bill.

Suggested Readings:
1. K.R.Das, K.M. Sinha, K.S.Paul Choudhury, G.G.banik; Accountancy (for H.S. first year); LBS Publication.
2. B.B. Dam; Accountancy (for H.S. first year).
3. A.K.Nadhani, K.K.Nadhani; Implementing Tally - 9; BPB Publication, Delhi.
4. N. Agarwal and S. Agarwal; Comdex Tally - 9 Course Kit (with CD).
5. A.K. Nandhani; Tally - 9, Training Guide, BPB Publication.

2.3 MATHEMATICS – II

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Sets, Relations and Functions: **Marks 15**
Sets, relations, properties of binary relations, closures of relation, equivalence relations, equivalence classes and partitions. Partial ordering relations and lattices. Functions, one-to-one and onto, principles of mathematical induction.

Graph theory   **Marks 15**
Basic Definition of graph. Connectivity of graph, cut points cycles, Hamiltonian graphs, trees, different characterization of trees, bipartite graph,
Algorithms on graph, Breadth first search, Depth first search

Combinatorics   **Marks 12**
Basic of counting principles, principle of inclusion-exclusion, application of inclusion and exclusion. Pigeonhole principle, generalized Pigeonhole principle and its application, permutations and combinations, permutations with repetitions, combinations with repetitions, permutations of sets with indistinguishable objects.

Matrices :   **Marks 13**
Row and column operations, vectors and matrices, partitioning of matrices, representing relations using matrices, Determinant of a square matrix, minor, cofactor, the Cayley-Hamilton theorem, inverse of a matrix, product form of inverse. Rank of a matrix. Solutions of simultaneous linear equations, existence of solutions, solution by Gaussian elimination, Eigen values and Eigen vectors.

Logic: **Marks 15**
Connectives, truth tables, Normal forms- CNF, DNF, Converting expressions to CNF and DNF, Theory of inference, Propositional calculus. Boolean Algebra. Predicate calculus (only introduction), predicates and quantifiers.

Vector Space   **Marks 10**
Fields (definition with a few examples), definition and examples of vector spaces.. Properties of linearly independent and dependent set of vectors. Basis and dimension of a vector space. Examples of finite dimensional vector spaces Elementary properties of R^n as a vector space.

Suggested Readings:
1. Elements of Discrete Mathematics, C. L. Liu, Mc-Graw Hill International Ed.
2. Discrete Mathematics and its Applications, K. H. Rosen, Mc-Graw Hill International Ed.
3. Discrete Mathematics structures with applications to Computer Science, J. P. Tremblay and R. Manohar, Mc-Graw Hill
4. Discrete Mathematics, N. Ch.SN Iyengar, K.A. Venkatesh, V. M. Chandrasekaran, P. S. Arunachalam, Vikash Publishing House Pvt Ltd.

2.4 ICT HARDWARE

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I: Evolution of computer system, Modern computer, Classification of computer,Personal Computer hardware: Monitor, Keyboard, Mouse, Scanner, printer, speaker   **16 marks**

UNIT II: Hard Disk Drive: logical structure and file system, FAT, NTFS. Hard disk tools: Disk cleanup, error checking, de fragmentation, scanning for virus, formatting, installing additional   HDD.   New   trends   in   HDD.   Floppy   Disk   Drive
16 marks

UNIT III: Optical Media, CDROM, theory of operation, drive speed, buffer, cache, CD-r, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives, New Technologies. Driver installation, Writing and cleaning CD and DVD.   **16 marks**

UNIT IV: Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors. Peripheral connectors. Bus slots, USB, pin connectors. Different kinds of motherboards. RAM, different kinds of RAM. RAM up gradation**.** Cache and Virtual Memory concept.   **16 marks**

UNIT V: SMPS. BIOS. Network Interface Card, network cabling, I/O Box, Switches, RJ 45 connectors, Patch panel, Patch cord, racks, IP address.   **16 marks**

BOOKS RECOMMENDED :

   1. Comdex: Hardware and Networking Course Kit:: DreamTech press
   2. PC hardware: A beginners Guide: Ron Gilster: Tata Mc Graw Hill.

2.5 LABORATORY

At least 15 practical assignments covering paper 2.1 (40 marks), 10 assignments covering paper 2.2 (30 marks) and 6 assignments covering paper 2.4 (30 marks) should be done by the students from the list prepared by the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered.

2.6 ENVIRONMENTAL STUDIES

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Unit I: The Multidisciplinary nature of environmental studies   2 lectures

Definition, scope and importance
Need for public awareness

Unit 2: Natural Resources   8 lectures
- Renewable and non-renewable resources
- Natural resources and associated problems
    a) *Forest resources:* Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest 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 extracting and using mineral resources, case studies.
    d) *Food resources:* World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problem, water logging, salinity, case studies.
    e) *Energy resources:* Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies.
    f) *Land resources:* Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems   *6 lectures*
- Concept of an ecosystem
- Structure and function of and ecosystem.
- Producers, consumers and decomposers
- Energy flow in the system
- 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 ecosystem(ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4: Biodiversity and its Conservation   **8 lectures**
- Introduction- definition, genetics, species and ecosystem diversities
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, national and local level.
- India as a mega-diversity nation.
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wild life, man-wild-life conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

Unit 5: Environmental Pollution   **8 lectures**
- Definition
- Causes, effects and control measure of
  a. air pollution
  b. water pollution
  c. soil pollution
  d. marine pollution
  e. noise pollution
  f. thermal pollution
  g. nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial waste.
- Role of individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.

Unit 6: Social Issues and the Environment: **7 lectures**
- From unsustainable to sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people, its problem and concern, case studies.
- Environmental ethics: issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Waste land reclamation
- Consumerism and waste product
- Environment protection acts
- Air(prevention and control of pollution) acts
- Wild life protection act
- Forest conservation act
- Issues involved in enforcement of environmental legislation, public awareness.

Unit 7: Human Population and the Environment   **6 lectures**
- Population growth, variation among nations
- Population explosion- family welfare programme
- Environment and human health
- Human rights
- Value education
- HIV/ AIDS
- Women and child welfare
- Role of information technology in environment and human health
- Case studies

Unit 8: Field work   **5 lectures**
- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain
- Visit to a local polluted site- urban/rural/ industrial/ agricultural
- Study of common plants, insects, birds
- Study of simple ecosystem, ponds, river, hill slopes etc.

Recommended Readings:

(i) Environmental Studies, Anindita Basak; Pearson Education, 2009.

3.1OPERATING SYSTEM

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Introduction: **Marks:10**
What is an operating system, batch systems, multiprogrammed, time-sharing systems, personal-computer systems, parallel systems, distributed systems, real-time systems.

Processes: **Marks:10**
Process Concept, Thread, design issues of thread, user space thread and kernel space thread. Usage of thread. Process states, Operation on Processes:- creation and termination. Implementation of process:- process table.

Process Synchronization: **Marks 10**
Race condition, Critical-Section, mutual exclusion. Solution to race condition and synchronization: - disabling interrupt, test-and-set-lock, Peterson's solution, semaphore, mutex, monitor, message passing. Classical problems:- The Dining philosopher, sleeping barber and readers-and-writers (bounded buffer) problems and their solution.

Scheduling: **Marks:10**
Basic Concepts, preemptive and non preemptive scheduling. Scheduling Algorithms. Types of scheduling: - batch, interactive and real-time. Goals of scheduling algorithms. FCFS, SJF, RR, priority, multiple queues, three-level scheduling.

Deadlocks: **Marks:10**
System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. Banker's algorithm.

Memory management: **Marks:10**
Multiprogramming. Address binding (relocation), and protection. Swapping. Virtual memory: - logical versus physical address space, paging, page fault, page table and its entries, demand paging, multi level page table, TLB, its entries and working. Page replacement algorithms: - LRU, optimal, NRU, FIFO, second chance, clock, NFU. Working set. What is segmentation, what are its benefits and drawbacks.

File system: **Marks:10**
What is file, file naming, file types(directory, regular, device), sequential access and random access files, file attributes, operations on file, hierarchical directory structure, path name(relative and absolute), operation on directories, disk layout, disk partition, file system layout, disk block allocation:-contiguous allocation linked list allocation, FAT, i-nodes, directories in UNIX, file system security

I/O management: **Marks: 10**
Basic principles and overall structure of I/O management subsystem, Device controllers, layers of the I/O subsystem:- interrupt handlers device driver, device independent I/O software and user space I/O software.

Suggested reading:

1. Modern Operating System, Tanenbaum, PHI Publication.
2. Operating System by Galvin, Wileys

3.2 COMPUTER ORGANIZATION AND ARCHITECTURE

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Introduction: **Marks:10**
Functional units of a computer, basic instructions (zero, one, two, three addresso, interconnection of functional units, bus structure, memory locations, memory addresses, memory operations, instruction and instruction sequencing (straight line sequencing and branching).
Fixed and floating point representation of numbers. Normalized floating point representation and arithmetic operations using normalized floating point numbers. IEEE standard for binary floating point representation
Addressing modes, stack, subroutine, I/O instructions.

Register Transfer Logic: **Marks: 12**
Introduction, interregister transfer, arithmetic microoperation, logic microoperation, shift microoperation, Conditional control statements, fixed point binary data, instruction code, design of a simple computer.

Processor Logic Design: **Marks: 15**
Processor organization, design of arithmetic and logic circuit, status register, design of accumulator.

Control Logic Design: **Marks 15**
Hardware control, microprogrammed control block disgram, symbolic microprogram, microprogrammed CPU organization.

I/O Subsystem: **Marks: 13**
Program controlled I/O, Interrupts: enabling and disabling interrupts, handling interrupts from multiple sources (priority control), DMA.

Memory Subsystem: **Marks: 15**
Semiconductor memory, SRAM, DRAM, ROM, speed size and cost, Cache memory, mapping functions.

Suggested Reading:
1. Digital logic and Computer Design, M.Morris Mano, PHI publication
2. Computer Architecture, Hamachar, Vranesic and Zaky.
3. Computer Organization and Architecture; William Stallings, Pearson.

3.3 DATABASE MANAGEMENT SYSTEM

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

File Structure: **Marks: 8**
Record storage and primary file organization: memory hierarchies and storage devices, Storage of DataBases, Placing file records on disks: Records and its Types, Files, Fixed length records and variable length records, Record Blocking, allocating file blocks on disks, operation on files.
Issues in Physical Design : Concept of indexes

Overview of Database Management System: **Marks : 17**
Definition of DataBase, Traditional File Approach vs. DBMS approach, Characteristics of the Data Base Approach, DBMS user, Role of a DBA, Advantage of using DBMS, DBMS architecture, Data independence
ANSI/SPARC 3 level architecture.

Relational Models: **Marks: 25**
Fundamental integrity rules: entity integrity, referential integrity, Relational algebra(Select , Project, Cross ,Product , theta join, equi join, natural join, outer join),Set Operation
ANSI SQL –92 Standard : DDL, DML, SQL constructs(Select .. From… Where… Group by ….. Having… Order by….), Insert, Delete, Update, View, Definition and use, nested quires, Constraints considers(NOT NULL , UNIQUE, Check Primary key. Foreign key)

Database Design: **Marks : 30**
Conceptual model, logical model, physical model.
ER model as a tool for conceptual design-entities, attributes and relationships, weak and strong entities, conversion of ER model into relational schema. DFD.
Normalization: informal design guidelines for relational schemas (overview level), functional dependencies, different types of keys. Normal forms (first, second, third, BCNF). Functional dependency diagram and design of relational database from it.

Suggested Reading:
1. Introduction to database management system, C.J. Date
2. Fundamentals of data base management system, Elmasri & Navathe
3. An introduction to Database systems; Bipin C. Desai; Galgotia publications.
4. Database Systems - Concept, Design and Applications; S.K.Singh; Pearson Education.

3.4 OBJECT ORIENTED PROGRAMMING

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Introduction: **Marks: 8**
What is OOP .Introducing Object-Oriented Approach, Relating to other paradigms.
Benefits of OOP and methods.

Basic Terms and Ideas: **Marks: 12**
Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between
C and C++ - cin, cout, new, delete operators. Functions in C++: main function, function
prototyping, call by reference, return by reference, functions- inline, friend, virtual, library.

Classes and Objects: **Marks: 20**

Encapsulation, information hiding, abstract data types, Object & classes, attributes,
functions, C++ class declaration, member functions, State identity and behavior of an
object, static data members and member functions, friend functions, constant member
functions. Constructors and destructors, instantiation of objects, Default parameter value,
object types, C++ garbage collection, Metaclass/abstract classes.
Operator overloading: Overload unary, binary operators, overloading binary operators
using friends, manipulation of strings using operators.

Inheritance: **Marks: 15**
Inheritance-multilevel, multiple, hierarchical, hybrid, virtual base class, abstract class,
Class hierarchy, derivation – public, private & protected, Aggregation, composition vs
classification hierarchies.

Polymorphism: **Marks: 15**
Polymorphism, Categorization of polymorphism techniques: compile time polymorphism,
Polymorphism by parameter, run time polymorphism- pointers to derived class, virtual;
function, pure virtual function.

Files and Exception Handling: **Marks: 10**
Persistant objects, Streams and files, Namespaces, Exception handling, Generic Classes.

Suggested Readings:
1. Herbert Schild, " The complete reference to C++", Osborn McGraw Hill
2. R. Lafore, "Object Oriented Programming using C++", Galgotia Publications
3. Ian Graham, "Object Oriented Methods", Addison Wesley..

3.5 LABORATORY

At least 12 practical assignments covering paper 3.1(30 marks), 6 assignments covering paper 3.3 (35 marks) and 12 assignments covering paper 3.4 (35 marks) should be done by the students from the list prepared the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the course is covered.

4.1 MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Internal Organization of 8085A microprocessor: **Marks:7**
User Programmable registers, PC, SP, accumulator, flags, data bus, address bus, control bus, instruction word size, opcode format, data format, memory addressing, I/O addressing, address decoding for memory and I/O.

8085A microprocessor architecture: **Marks: 16**
 Pinout of 8085A microprocessor, multiplexed address/data bus, control and status signal, demultiplexing of control signals, other signals, bus timings, fetch decode and execute cycle, timing diagram for opcode fetch memory read and memory write, interfacing memory and I/O.

Assembly Language Programming in 8085A Microprocessor: **Marks: 25**
 Complete instruction set in detail, programming examples, logic operation, counters and time delays, stack and subroutine, processing arrays, bit manipulation.

Interfacing: **Marks: 16**
 In and OUT instruction, decoding addresses, Interfacing LED, relay, seven segment display, switch, keyboard,.

Interrupts: **Marks: 16**
 Vectored interrupts, interrupt priorities, general purpose programmable peripheral devices, 8255A control and status registers, programming 8255A, introduction to 8279, 8254 and 8237 (block diagrams and basic functions).

Suggested Reading :

1.   Microprocessor Architecture, Programming and Application with the 8085 by Ramesh S.Gaonkar
2.   Microprocessor and Microcomputer by B.Ram.

4.2 SOFTWARE ENGINEERING

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Introduction: **Marks: 25**
Software Processes & Characteristics, Software life cycle
Models ---- Waterfall, Prototype, Evolutionary and Spiral Models
Software Requirements analysis & specifications: Requirement engineering, requirement, elicitation techniques like FAST, QFD, requirements analysis using DFD, Data dictionaries, ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

Software Project Planning: **Marks: 15**
Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, Risk Management.

Software Design: **Marks: 15**
Data design**,** Architectural design**,** Interface design, Function Oriented Design, Object Oriented Design, Cohesion & Coupling, Classification of Cohesiveness & Coupling,
Software Metrics: different types of project matrics.

Software Testing and Maintenance: **Marks: 25**
Testing Process, Design of Test Cases, Types of Testing, Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing. Debugging Activities
Software Maintenance: Management of Maintenance, Maintenance Process, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation. Software quality Assurance.
CASE tools--- Analysis tools, design tools, SQA tools, software testing tools.

Suggested Readings:
1. Rajeev Mall "Software Engineering" PHI
2. Pressman Roger " Software Engineering A Practitioners Approach" Tata McGraw Hill
3. James F. Peters, Witold Pedrycz "Software Engineering An Engineering Approach"

4.3 PROGRAMMING IN JAVA

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT-I   **Marks : 40**
Java language basics: Basic features, Java virtual machine concepts. Data types:-primitive data types and variables. Java Key words, integer and floating point data type, character and Boolean types, declaring and initialization variables. Java operators, Expressions, Statements-- selection statements, control statements, iterative statements, jump statements.
Classes & Objects: Creating objects, assigning object reference variables. Introducing methods.
Arrays:- Static methods, Constructors, Overloading constructors., Strings, and Vector.
This Keyword , Using object as parameters:- argument passing, returning objects.
Method Overloading , garbage collection , the Finalize() method.
Inheritance and Polymorphism- Inheritance basics, access control, multilevel inheritance, method overriding, abstract classes, polymorphism, Final keyword.
Multithreaded programming,
I/O in Java :- I/O basics, Streams and stream classes , reading from and writing to console, reading and writing files

UNIT – II   **Marks : 10**
Java applets: The Applet Class, Applet Architecture, An Applet skeleton: initialization and termination, handling events, HTML Applet Tag, Control.
UNIT – III   **Marks : 10**
Networking : Socket overview -- datagram socket and TCP/IP based server socket, Internet Addressing --- DNS, UR. Event handling Drivers in Java.
UNIT – IV   **Marks : 20**
Java Database Connectivity: Establishing a connection(JDBC, ODBC connectivity) , transactions with database.

Suggested Reading
1. Programming in Java, E. Balaguruswamy, Tata Mc-Graw Hill.
2. Patrik Naughton & Herbert Schildt " The complete reference java"

4.4 AUTOMATA THEORY AND LANGUAGES

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Finite Automata   **Marks: 14**
DFA, NFA, NFA with ε-moves. Equivalence of DFA and NFA. Reduction of the number of states in a finite automata.

Regular Languages and Regular Grammar   **Marks: 15**
Concept of languages and grammar. Regular expressions. Connection between regular expressions and regular languages. Regular grammars, Right and Left-Linear Grammars. Equivalence between Regular languages and Regular grammars.

Properties of Regular Languages   **Marks: 12**
Closure under simple set operations- union, intersection, concatenation, complementation and star-closure. Decision algorithms for emptiness, finiteness and infiniteness, equality. Proof of non-regularity using Pigeonhole principle and using pumping lemma for regular languages.

Context Free languages   **Marks: 15**
Context-free grammars, leftmost and rightmost derivations, derivation trees. Parsing and Ambiguity in grammars and languages. Simplification of Context free Grammars-removing useless productions, empty-productions and unit-productions. Normal forms-Chomsky and Greibach normal forms.

Pushdown Automata   **Marks: 12**
Definition and language accepted (acceptance by empty stack and final state and their equivalence). Pushdown Automata and Context free languages. Deterministic PDA and Deterministic Context free Languages.

Properties of Context free Languages   **Marks: 12**
Pumping Lemma for CFL. Using Pumping Lemma to show certain languages not to be Context free. Closure properties of CFL – closure under union, concatenation and star-closure. and showing that CFLs are not closed under intersection and complementation. Decision algorithms for emptiness, finiteness and infiniteness.

Suggested Reading

1. An introduction to Formal Languages and Automata, Peter Linz, Narosa.
2. Introduction to Automata Theory, Languages and Computation, Hopcroft and Ullman, Addison Wesley.
3. K. L. P. Mishra, N. Chandrasekaran; Theory of Computer Science (Automata, Languages and Computation), P. H. I.

4.5 LABORATORY

At least 8 practical assignments covering paper 4.1 (40 marks), 3 assignments covering paper 4.2 (20 marks) and 8 assignments covering paper 4.3 (40 marks) should be done by the students from the list prepared the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered.

5.1 MANAGEMENT INFORMATION SYSTEM

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT – I: **Marks: 16**
The meaning and role of MIS**:** What is MIS? Systems approach, the systems view of business, MIS Organization within the company.
Management Organizational theory and the systems approach:
Development of organization theory, definition of a system, general model of a system, types of system, information system.

UNIT – II   **Marks: 16**
Information Systems for decision making: Evolution of an information system, Basic Information Systems, decision making and MIS, MIS as a technique for making programmed decisions, decision assisting information systems.
Strategic and project planning for MIS: General business planning, appropriate MIS response, MIS planning – general, MIS planning – details.

UNIT – III   **Marks: 16**
Conceptual system design: Define the problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternatives, conceptual designs and select one, document the system concept, prepare the conceptual design report.

UNIT – IV   **Marks: 16**
Implementation, evaluation and maintenance of the MIS: Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train and operating personnel, computer related acquisitions, develop forms for data collection and information, dissemination, develop the files, test the system, cut over, document the system, evaluate the MIS, control and maintain the system.

UNIT V: **Marks: 16**
Quality assurance and evaluation of information system, the concept of quality in information systems, organizational functions for control and quality assurance, quality assurance for applications, conditions for quality assurance, quality assurance in application development, application design for quality, maintenance of application quality, maintenance of data quality.

Suggested Reading:
1.Murdick,Ross and Classett, Information system for modern management, PHI
2. Davis and Olson , Management Information system, Tata McGraw Hills
3. James A O'Brian , Management Information Systems, Galgotia

5.2 WEB TECHNOLOGY

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Overview of the World Wide Web and the internet: **Marks: 8**
A brief history of TCP/IP and the Internet, Internet services-email, telnet, ftp , Internet components, the birth of web, web page, home page, web site, types of Internet connection-dial up, DSL, Broadband, VSAT, WiFi

Web Servers and Browsers: **Marks: 8**
Web browsers-Netscape navigator and IE, Web browser helper applications, Web servers, Web server architecture

Internet Architecture: **Marks: 6**
IP addresses and its working, domain name system, URL

Inside the Firewall: **Marks: 10**
Firewall, proxy server, overview of intranet security, web server security, username/password authentication. COM, DCOM, CORBA.

Linking Database to The Web   **Marks: 10**
JDBC, ODBC- CGI and ASP, Dynamic page creation and advantages.

HTML editors and tools   **Marks: 12**
Basic HTML, HTML tags, creating list in HTML, hyperlinks, multimedia, HTML forms, tables in HTML, frames in HTML, image maps, style sheets in HTML. DHTML, XML-Introduction, Need for XML, Advantages, simple XML programs, DTD.

Java Script   **Marks: 14**
Client side Scripting languages, history of JavaScript, Java vs. Java Script, Creating interactive documents using JavaScript.

Using Visual Basic Script   **Marks: 12**
The benefits of VBScript, Interacting VBScript with HTML forms, VBScript variables and operators, VBScript flow of control statements, Server Side scripting languages Introduction.

Suggested Readings:
1) The Internet –Complete M.L Young ; Tata McGraw Hill
2) Using CGI by J.Dwight , M.Erwin, R. Niles: Prentice Hill
3) Mastering JavaScript and Jscript by J.Jaworski ;BPB Publication
4) Dynamic HTML –the definitive references by D.Godman: Shroff Publishers
5) Understanding XHTML by D.P Nagpal: Wheeler Publishing.

5.3 COMPUTER NETWORKS
Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT 1[INTRODUCTION + PHYSICAL LAYER]

INTRODUCTION   **Marks:8**
Usage of Computer Network, study of topology, concept of protocol, Connection less and connection Oriented Service, Layered architecture, study of OSI and TCP model.

PHYSICAL LAYER   **Marks:10**
Introduction to Guided and Unguided media, physical description of twisted pair, coaxial cable, and fiber optic cable, Maximum data rate of a channel (Nyquist and shannons law), Basic concepts of Modulation and demodulation, Data encoding techniques (Manchester and Differential Mancestar encoding)
Network connecting devices hub, repeater, bridge, switch, router, and gateway

UNIT 2 [DATA LINK LAYER]
Logical Link Control   **Marks: 12**
Functions and services of DLL, Framing and Framing Methods, Concept of Error Control, Error Correcting code(Hamming code), Error detecting code(CRC), Concept of Flow Control, Piggybacking, Stop-and-Wait sliding window protocol, Pipelining techniques(Go backN, Selective Repeat).

MEDIUM ACCESS CONTROL   **Marks: 12**
What is MAC? Static Channel Allocation, Dynamic Channel Allocation, Pure ALOHA, Slotted ALOHA, Carrier Sense Protocol, 1-persistent CSMA, Non-PersistentCSMA, CSMA/CD, Ethernet(IEEE 802.3) and Ethernet Frame Format, Basic concept of Wireless LAN(IEEE 802.11), Binary Exponential Backoff Algorithm.

UNIT 3 [NETWORK LAYER]   **Marks:18**
Services and Functions of Network Layer, Virtual Circuit and Datagram Subnet, Routing, Distance Vector Routing, the Count-to-Infinity problem, Link State Routing, Congestion (definition and factors of congestion only), Definition of Quality of Service, Traffic shaping, Leaky Bucket and token Bucket Algorithm, Concept of IP Address.

UNIT 4[TRANSPORT LAYER]   **Marks:10**
Functionality of transport Layer, Establishment and release of connection, TCP and UDP(Overview), Introduction to Sockets, port numbers.

UNIT 5 [APPLICATION LAYER]   **Marks:10**
Concept of E-mail, Telnet, WWW, DNS, HTTP, FTP, URL, SMTP, MIME.

 Suggested Reading:
1. Computer Networks, Andrew S. Tanenbum, PHI Publication
2. Data and Computer Communication, Stalling W, 5ed, PHI (EEE).

5.4 COMPUTER ORIENTED NUMERICAL METHODS AND STATISTICAL TECHNIQUES

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Representation of numbers: **Marks: 10**
Floating point representation, single and double precision, round off errors and truncation errors.

Solution of non-linear equation: **Marks: 12**
      Bisection method, Newtons method, Regula Falsi method, secant method, fixed point algorithm.

Solution of simultaneous linear equation: **Marks: 12**
      Basic elimination method, Gaussian elimination method, Gauss Jordan method, method of successive approximation.

Ordinary differential equation: **Marks: 10**
      Euler's method, Runge Kutta method, Milnes method.

Interpolation: **Marks: 8**
      Newton's interpolation, Lagrange's interpolation, Newton's divided difference method.

Numerical integration: **Marks:8**
      Trapezoidal rule, Simpson rule, Newton's Cotes method.

Statistical methods: **Marks: 20**

Measure of central tendency: Mean, Median and Mode.
Probability, probability distribution, Binomial, Poison and normal distribution.
Mathematical expectations, moments, correlation, regression.

Suggested Reading:

1.M.K.Jain, S.R.K.Iyenger, R.K.Jain, " Numerical methods for Scientific and Engineering Computation", Wiley Easterns.
2. K.E. Atkinson, " An introduction to numerical analysis", J.Willey and Sons.

5.5 LABORATORY

At least 10 practical assignments covering paper 5.2 (40 marks), 4 assignments covering paper 5.3 (35 marks) and 12 assignments covering paper 5.4 (25 marks) should be done by the students from the list prepared the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered.

6.3 SYSTEM ADMINISTRATION USING LINUX
Total Marks : 100

Theory - 50 (Semester end examination - 40, Internal Assessment - 10)
Practical - 50 Semester end examination - 40, Internal Assessment - 10)

Unit I :   **Marks:8**
What is System Administration? Duties of a System Administrator. Basic features of the Linux operating system. Installation requirements,Partioning the Hard drive in Linux,Installing the Linux syatem, installing and configuring softwares in linux,Linux kernel program, system Startup and Shutdown. Standard I/O,Standard error,redirection and piping.

Unit II :   **Marks: 8**
 Basics of Linux file system: hierarchy and types. absolute and relative path names.Basic commands for files and directories- ls,cp,mv,rm,mkdir,rmdir,more,creating and viewing files, mounting and unmounting file systems and partitions. Structure of /etc/fstab file and its purpose. I-node, directories, hard link, symbolic link. setting user and group ownership of files and access permissions, study of different linux shells (sh, bash, csh, zsh). Environment variable. Bash variables, login vs non-login shells. Shell script basics. Introduction to grep, awk, perl

Unit III :   **Marks: 8**
Basic commands for starting and stopping processes, basic process attributes and their role in access control. Examining the list of running processes on the system and understand the data presented there. Background process,Sending signals to processes and modifying process priorities. Job control. Crontab file format, Backup and Restore procedure, configuring the print queue, selecting the printer driver, editing the printer configuration, deleting printer setting default printer.

Unit IV :   **Marks: 8**
Managing user accounts: Adding a user,password,Creating Groups,adding and deleting groups,viewing user account information,understanding the 'root' account, implementing sudo. What is file ownership and access permission,,System monitoring and logging,Monotoring memory usage, disk space usage and I/O activity. Logging and its necessity, Customizing ststem Log information.

Unit V: **Marks: 8**
 The rules governing IP address classes and netmasks, Network Address,Netmask and Gateway.configuring Interface with ifconfig,adding routes, ping,netstat,traceroute,telnet,Understanding the significance of the /etc/services file and well known port numbers. Basics of configuring NFS, NIS, DNS, FTP, Squid Proxy,DHCP server,iptables and firewall.Basic Network Security Issues.

Practical: 40 Marks

At least 20 Practical assignments should be done by the students from the list prepared the

UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered.

Suggested Readings

1.Red Hat Linux:Proffitt:PHI

2.Introduction to system Administration:IBM series:PHI

3.Essential System Administration:Frisch:O'REILLY

6.4 PROJECT WORK

Total marks: 200 (Internal assessment - 40)

Each student will be assigned some project work at the starting of the sixth semester. The objective of the project is to train the student to independently search, identify and study real-life important topics in CS/IT; to develop skills among students in a particular field of CS/IT; and to expose students to the world of technology, innovation, and research. Each student (or group of at most 2 students) is expected to take a unique problem under the guidance/supervision of a faculty member of the department. The problem should be such that the students get a chance to explore one or two technologies in depth and grab good command over those technologies after successful completion of the project. Repetition of the problems already attempted by students of the previous years should not be encouraged unless the problem has exceptionally great research importance and scope. Application problems, if found interesting and arisen at the demand of a particular situation, may also be assigned; but typical information management systems with just two or three simple database tables and/or data-entry forms are to be discouraged. The project may be done in other Institutes/Organizations with prior permission from the concerned department of the College and in this case also one project supervisor should have to be from the concerned department in the College. The work will have to be submitted in the form of a dissertation. Project presentation and evaluation will have to be done as per the regulation of TDC for semester system of G.U. with choice based credit and grading system.

6.1.1 QUEUING THEORY AND OPTIMIZATION

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Linear Programming Techniques: **Marks: 25**
The simplex algorithm, Charma's method of penalties, the two phase algorithm, problem of degeneracy and cycling, Duality theorem, revised simplex algorithm, revised simplex method versus simplex method.
Sensitivity analysis, changes in the requirement vector, the cost vector and the coefficient matrix.

Transportation Problem: **Marks: 15**
Various algorithms such as the algorithm of stepping stones.

Non-linear Programming: **Marks: 15**
Constraint minima and maxima, necessary and sufficient condition for maxima and minima: Kuhn-Tucker principle, quadratic programming.

Queuing Theory: **Marks: 15**
 The exponential distribution, queue disciplines such as M/M/1, M/M/C.

Simulation: **Marks : 10**
Even type of simulation, Monte Carlo techniques, simulation techniques applied to queues.

Suggested Readings:
1. S.L Gass, "Linear Programming", Springer
2. K.V.Mittal & G Mohan, " Optimization Methods", Wileys
3. K.Swarap, P.K.Gupta, M.Mohan, " Operation Research",
   Sultan Chand & Sons Publication

6.1.2 DATA WAREHOUSING AND DATA MINING

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Data Warehousing **Marks: 20**

Overview and Concepts: Need for Data Warehousing, Basic elements of Data Warehousing, differences between Database Systems and Data Warehouse.

Planning and Requirements: Project planning and management, collecting the requirements.

Architecture and Infrastructure: Data Warehouse Architecture and its components, Infrastructure and metadata.

Data Design and Data Representation: Principles of dimensional modeling, advanced topics- data extraction, transformation and loading, data quality.

Information Access and Delivery: Matching information to classes of users, OLAP in Data Warehouse, Data warehousing and the web.

Implementation and Maintenance: Physical design process, Data Warehouse deployment, growth and maintenance.

Data Mining Introduction : **Marks: 10**

Basics of data mining, Different definitions of Data Mining and related concepts, Data mining process- Data preparation, data cleaning and data visualization. KDD process. Data miming techniques: Clustering, Association rules and Decision trees.

Clustering: **Marks:20**

Partitional versus Hierarchical Clustering, types of data in clustering. Partitional clustering methods – k-means, k-medoids, PAM, CLARA, CLARANS. Hierarchical clustering methods – BIRCH, CURE. Density based clustering methods- DBSCAN. Categorical clustering – DBSCAN.

Rule Mining: **Marks:15**

What is an association rule? Mining association rules, frequent sets and border sets, algorithms for mining association rules – Apriori algorithm, Pincer-Search algorithm, Border algorithm. Generalized association rule, quantitative association rule, association rule with item constraint.

Decision Trees: **Marks: 15**

Introduction, tree construction principle, decision tree generation algorithms – CART, ID3.

Suggested Reading:

1. A.K. Puzari, Data Mining Techniques, University Press.
2. J. Han and M. Kamber. Data Mining: Concepts and Techniques. Morgan Kaufman. 2001.
3. P. Tan, M. Steinbach and V. Kumar; Introduction to Data Mining; Pearson Education (LPE); 2009.

6.1.3 GUI PROGRAMMING
Total marks - 100

Theory - 50 (Semester end examination - 40, Internal Assessment - 10)
Practical - 50 Semester end examination - 40, Internal Assessment - 10)

Theory: 40 Marks

Introduction:

Basic idea of GUI based applications, advantages, IDE and its use; User Interface design principles, Event Driven Programming.

Review of Data Types Control Statements:

Data Types, Variables & Constant, Arrays, Procedures, Methods, Arguments Passing, Functions Return Values. Control Flow Statements: - If-then, if-then-else, select case; Looping Statements- For, While, Do-while; and Nested Control Structure.

Multiple Document interface – Parent & child forms & method

Working With Forms & Standard Controls:

Form designing; adding controls to forms: Text Box, Command Button, Combo Box, List Box, Radio buttons, Check boxes, Pull-down and Pop-up Menus, File list, other Controls.

Error Handling: - Types of errors, Error handling methods and Functions.

Graphics Controls:

Graphics Controls, Image Handling, Coordinate System, Graphic methods- Text Drawing, Lines & Shape, Filling Shapes, and Grid Methods.

Database Connectivity:

Connecting to databases; addition, retrieval, deletion, and updation of data into database tables; adding data controls in applications;

Practical: 40 Marks

Practical application development using either .NET or Java.
At least 20 Practical assignments covering each of the topics mentioned in the theory part. Emphasis must be on developing full-fledged applications containing multiple forms and database connectivity.

BOOKS RECOMMENDED:

1. J. Weber; Special Edition Using Java 2 Platform; PHI.

2. M. P. Bhave, S. A. Patekar; Programming with Java; Pearson education.

3. Joshua Bloch; Effective Java: Programming Language Guide; Sun Microsystems.

6.2.1 COMPUTER GRAPHICS

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

UNIT I   **Marks: 20**

Introduction: computer graphics and its applications.

Input and Output devices: keyboard, mouse, trackball & spaceball, joystick, data glove, digitizers, image scanners, touch panels, light pens, voice systems.

display devices- Refresh CRT; Display techniques- Raster-scan display and Random-scan display; color display techniques- Beam penetration method and Shadow-mask method; Direct view storage tubes; emissive & non-emissive flat-panel displays-Plasma panels, Thin-film electrostatic displays, LED, LCD; Three-dimensional viewing devices-Genisco Spacegraph system, Stereoscopic and Virtual-Reality systems; display systems architecture- Raster-scan systems, Random-scan systems, architectures with video-controller and display processor.

UNIT II   **Marks: 20**

Overview of Graphics softwares: classifications, graphics functions for various operations, software standards- PHIGS, PHIGS+, GKS.

Output primitives: line-drawing algorithms- DDA algorithm and Bresenham's algorithm; Midpoint algorithms for circle & ellipse generation; area-filling algorithms-scan-line polygon-fill, nonzero-winding number rule; scan-line curve filling, boundary-fill algorithm, flood-fill algorithm; Character generation techniques- generation of bitmap and outlined font.

UNIT III   **Marks: 18**

2-D geometric transformations: Basic transformations- translation, rotation and scaling; matrix representations and Homogeneous co-ordinate representations; Composite transformations among translation, rotation and scaling; General pivot-point rotation; General fixed-point scaling; General scaling directions; Other transformations- reflection and shear; Transformation between co-ordinate systems; Definition of Affine transformations.

2-D viewing: definition; viewing transformation pipeline; window-to-viewport co-ordinate transformation.

2-D Clipping operations: definition; point clipping; line clipping- Cohen-Sutherland algorithm; polygon clipping- Sutherland-Hodgeman algorithm; curve clipping, text clipping.

Interactive picture construction techniques: Basic-positioning methods; constraints; grids; gravity fields; rubber-band methods; dragging; painting & drawing.

UNIT IV   **Marks: 6**

3-D concepts: Display methods- Parallel projection, perspective projection, depth visible line & surface identification, surface rendering, exploded & cutaway views, 3-D & stereoscopic views.

3-D geometric transformations: Translation; Rotation- rotations about co-ordinate axes, general 3-D rotation; Scaling; Reflection; Shear.

3-D viewing: viewing transformation pipeline; world co-ordinate to viewing co-ordinate transformation.

UNIT V   **Marks:16**

Projections: Parallel projection techniques- orthographic & oblique projections and their transformation equations; Perspective projection and transformation equations.

Visible surface detection: definition; classification of algorithms- object-space methods & Image-space methods; algorithms for visible surface detection- Depth-buffer method, A-buffer method, Ray-casting method; curved-surface detection; wireframe displays;

Illumination and Surface rendering: definition and importance; light sources; Definition of basic illumination models- Ambient light, Diffuse reflection, Specula reflector and Phong model, combined diffuse and secular reflections for multiple light sources, Warn model, Intensity attenuation, Color considerations, Transparency, Shadows; Ray-tracing methods- The basic ray-tracing algorithm.

Color models and applications: properties of light; standard preliminaries- XYZ model, CIE chromaticity diagram; color models- RGB, YIQ, CMY, HSV, HLS; conversion between color models.

Suggested Readings:

1. Holiver, Dick; SAMS Teach Yourself Html 4 in 24 Hours; Techmedia.
2. Ashbacher, Charles; SAMS Teach Yourself XML in 24 Hours; Techmedia.
3. SAMS Teach Yourself JavaScript in 24 Hours; Techmedia.
4. Mitchell, Scott & Atkinson, James; SAMS Teach Yourself Active Server Pages 3.0 in 24 Hours; Techmedia.

6.2.2 DATABASE DESIGN AND PROGRAMMING
Total Marks: 100

Theory - 50 (Semester end examination - 40, Internal Assessment - 10)
Practical - 50 Semester end examination - 40, Internal Assessment - 10)

UNIT -1 Introduction to database design   **Marks: 10**

Software development life cycle (software development cost, structures system analysis and design, structured system analysis, structured design), Database development life cycle(DDLC), Database design approach (Bottom-up, top-down, inside-out, mixed strategy).
Phases of database design – Data requirement collection & analysis, conceptual database design, DBMS selection, logical & physical database design, prototyping, database implementation and tuning .

UNIT – 2   DBMS architecture   **Marks: 10**

Centralized DBMS architecture, Basic client server architecture. Two-tier client server architecture, Three tier client/server architecture for web application.
Issues in application development : Transaction concepts (execution and problems) Concurrency control (problems, degree of consistency, permutable action, schedule, serializable schedules, locking methods for concurrency control.

UNIT-3   Database security   **Marks: 8**

Introduction, goals of database security. Discretionary access control (Granting /Revoking privileges, Audit trials), Mandatory access control, Firewalls, Authorization and authentication.

UNIT-4 Introduction to SQL and database programming   **Marks: 12**

Specifying constraints, Complex SQL queries, views (virtual tables in SQL), concept of cursor and triggers. Stored procedure, transactions and cursors.
Issues and techniques, Approaches to database programming. Typical sequence of interaction in database programming. Embedded SQL, Dynamic SQL and SQLJ: Retrieving single tuple with embedded SQL, Retrieving multiple tuples with embedded SQL using Cursors , Specifying queries at runtime using dynamic SQL, Embedding SQL commands in JAVA, Retrieving multiple tuples in SQLJ using Iterators. Database programming with function calls SQL/CLI and JDBC:SQL function calls for JAVA programming.

Practical : 40 marks

At least 20 Practical assignments should be done by the students from the list prepared the UG Committee of Courses and Studies in Computer Science. The assignments are to be selected in such a way that the whole course is covered.

Suggested Readings:

1. Fundamentals of database management system by Elmasri and Navathe, Pearson Ed.
2. MySql for professionals by Ivan Bayross
3. Database System Concepts by Silberschatz, Korth and Sudarshan, Mc-Graw Hill.

6.2.3 COMPILER DESIGN

Total marks: 100 (Semester end examination - 80, Internal assessment - 20)

Introduction: **Marks:8**
What is a compiler? Phases of compiler. Overview of working of a compiler, linker, loader.

Lexical Analysis: **Marks:7**
NFA, DFA, conversion from NFA to DFA. Regular expression. Regular expression to NFA conversion. Minimisation of DFA. ,Structuer of Lexical analyser ,use of finite autometa to write lexical analyser .

Syntax analysis: M**arks:25**
Grammar representation. Derivation and parse tree. Ambiguity and possible elimination. Top down parsing. Recursive descent and predictive top down parsing. Elimination of Left recursion. Bottom up parsing. Operator precedence parsing, LR parsing (including SLR and LALR). Error detection and recovery. Parser table construction.

Code generation: **Marks:25**
Symbol table contents, implementation. Type checking. Syntax directed translation. Forms of intermediate codes. Abstract Syntax Trees, Directed Acyclic Graph, Three address code. Intermediate code generation for different language constructs , boolean expressions, if, if-else, while, case or switch, function calls. Target code generation issues, registerallocation, Runtime storage management.

Code Optimisation: **Marks:15**
DAG, basic blocks, Common sub-expression elimination, variable propogation, code motion, strength reduction, elimination of dead code, loop optimisation. Data flow analysis.

Suggested Reading:

1)   Aho, Sethi, Ullman; Compilers, Principles, Techniques, Tools, Pearson Education
2)   Compiler Design, Santanu Chattopadhyay, P.H.I.

PRACTICAL ASSIGNMENT LIST FOR BCA
(Bachelor of Computer Application)

1.5 LABORATORY

Covering paper 1.1 - 50 marks (Internal 10)

At least 20 programming assignments have to be done by each student from the following list. The assignments should be selected in such a way that all the features of C language are included.

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1. Write a program to convert a given temperature value from Fahrenheit scale to Centigrade scale and vice versa.
2. Write a program to display ASCII value of a character.
3. Write a program to check whether a number is perfect or not.
4. Write a program to find out the biggest of three numbers using nested if.
5. A company insures its drivers if either of the following conditions are satisfied
    - Driver is married.
    - Driver is an unmarried, male and above 30 years of age.
    - Driver is unmarried, female and above 25 years of age.

    Write a program to decide if a driver is to be insured using logical operators.
6. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also their respective counts.
7. Write a program to read values of n and x and print the value of y using switch case where
    a. y=n+x   when n=1
    b. y=1+x/n   when n=2
    c. y= n+3x   when n=3
    d. y=1+nx   when n>3 or n<1.
8. Write a program to n values of sales and then calculate the commission on sales amount where the commission is calculated as follows:
    a. If sales <= Rs.500, commission is 5%.
    b. If sales > 500 but <= 2000, commission is Rs 35 plus 10% above Rs 500.
    c. If sales   > 2000 but <= 5000,commission is Rs 185 plus 12% above Rs.2000.
    d. If sales > 5000 ,commission is 12.5%.
9. Write a program to find out minimum, maximum, sum and average of n numbers without using array.
10. Program to find mean and standard deviation (SD) for a set of n numbers without using array.
11. Write a program to find out the roots of a quadratic equation. Use proper testing to find checks for real and complex roots.

12. Write a program to print the digits of a number in words. (eg. if a number 841 is entered through the keyboard your program should print "Eight Four One".)

13. Write a program to print the PASCAL Triangle up to the n-th row where n is an input to the program.

14. Write a function to return the HCF of two positive integers. Write a main function to read two positive integers and print their HCF and LCM by using the above function.

15. Write a program to convert a decimal number into binary number using function.

16. Write a program to display the result of sine series using function.

17. Write a program to find the sum of the following series

$$1+x-x^3/3!+x^5/5!-x^7/7!+ \ldots \ldots$$ corrected up to the 3 decimal place.

18. Write a program to read n numbers in a sorted array and insert a given element in a particular position

19. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.

20. Write a program to print the values of ^nc_r and ^np_r for given positive integers $n \geq r > 0$. Use a function fact(n) to return the factorial of a non-negative integer.n.
$$^nc_r=n!/r!*(n-r)! \qquad ^np_r=n!/(n-r)!$$

21. Write a program to display the first n Fibonacci numbers using function.

22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.

23. Write a program to Multiply two matrices using function

24. Write a program to display the upper Triangle and lower Triangle of a given square matrix using function.

25. Write a function to check if a given square matrix is symmetric or not. Write a main function to implement it.

26. Write a program to read a m X n matrix and calculate the Row sum and Column Sum of the matrix

27. Write a function to read in an integer and print the representation of the number using the sign and magnitude representation scheme using 8 bits. The program should check for overflow/under flow conditions. The left most bit is to be used as the sign bit.

28. Write a program to merge two sorted arrays.

29. Write a program to implement selection sort using function.

30. Write a program to count the number of vowels in a string.

31. Write a program to concatenate two strings using function (without using library function).

32. Write a program to convert a string from upper case to lower case and vice versa.

33. Write a program to swap two numbers using function (pass the pointers).

34. Write a program to sort n number of strings in ascending order using pointer.

35. Write a program using pointers to copy a string to another string variable (without using library function).

36. Declare a structure of a student with details like roll number, student name and total marks. Using this, declare an array with 50 elements. Write a program to read details of n students and print the list of students who have scored 75 marks and above.
37. Create a structure to store the following information of employees.
    a. Employee's number, name, pay and date of joining.
    It has been decided to increase the pay as per the following rules:
             Pay <= Rs.3000   : 20% increase
             Pay <= Rs.6000 but > Rs.3000   :15%   increase
             Pay > Rs.6000   : no increase
    Write a program to implement the above structure.
38. Write a program to read a text file and count the number of vowels in the text file.
39. Write a program to copy a text file to another file.

Covering Paper 1.3 - 50 marks (Internal 10)

Each student should do at least 15 assignments from the following list. The list should have assignments from each of the following units.

BASIC ELECTRICAL CIRCUITS:

1. Verification of Voltage Division Rule
2. Verification of Current Division Rule.
3. Verification of the Thevenin's Theorem and determines the equivalent Circuit.
4. Verification of the Norton's Theorem and determines the equivalent Circuit.

SEMICONDUCTOR DEVICES:

5. Determination of V-I characteristics of Semiconductor Diode and draw it's Load Line and determine knee voltage.
6. Study of the reverse bias characteristics of a Zener Diode.
7. Design a Half Wave rectifier using semiconductor Diode. Use filtering to reduce Ripple.
8. Design a Full Wave rectifier using semiconductor Diode. Use filtering to reduce Ripple.
9. Design a Full Wave Bridge rectifier using semiconductor Diode. Use filtering to reduce Ripple.
10. Study of the static characteristics of the BJT in C-E mode and to determine h parameters.
11. Study of the static characteristics of the BJT in C-B mode and to determine h parameters.
12. Design a single stage RC coupled amplifier using BJT in C-E mode and to determine its voltage gain
13. Design a amplifier using BJT in C-B mode and to determine its voltage gain
14. Design of a emitter follower or CC amplifier and measure voltage gain.

DIGITAL CIRCUIT AND DESIGN:

15. List and verify the truth table of common Digital IC of the TTL series and display. Common logic gates are AND gate, OR gate, NOT gate, NAND gate, NOR gate, EXOR gate.
16. Verification of DeMorgan's Theorems.
17. Design a Half adder using digital logic gates. Verify its truth table.
18. Design a Full adder using digital logic gates. Verify its truth table.
19. Design of R-S Flip Flop; modify it to D Flip Flop. Verify the truth tables.
20. Design of a J-K Flip flop, verify the truth table.

OP AMP and IC555:

21. Study of the OP AMP as inverting and non inverting amplifier using IC741.
22. Study of the OP AMP as adder and subtractor.

2.5 LABORATORY

Covering paper 2.1 - 40 marks (Internal 8 marks)

Write programs using C language

Each student should do at least 15 assignments from the following list.
1. Implement binary search and linear search algorithms on arrays.
2. Implement following sorting algorithms :
      i)   Bubble sorting
      ii) Insertion sort
      iii) Heap sort
      iv) Quick sort
      v)   Merge sort

3. Write a program to create a singly linked list and insert an element at the beginning, end, and at a given position of the linked list.

4. Write a program to create a singly linked list and delete an element from any position of the linked list.

5. Write a program to create a singly linked list. Write functions for
      i. counting the number of elements in a list
      ii. to search for a given element in a list. If the item has been found then it should return the position at which the item was found; otherwise it should return -1 to indicate not found.

6. Write a function to concatenate two linked lists.

7. Write a function to merge two sorted linked lists.

8. Write a program to create a doubly linked list and insert an element at any position.

9. Write a program to create a doubly linked list and delete an element from a given position.

10. Write a program to create a circular linked list and insert / delete an element at any position.

11. Write a program to implement a stack using
            i) array structure
            ii) linked list structure

12. Write a program to implement two stacks using a single array.

13. Write a program to evaluate a postfix expression using stack.

14. Write a program to convert an infix expression into a postfix expression.

15. Write a program to implement a queue using array.

16. Write a program to implement a queue using linked list.

17. Write a program to implement a circular queue using array.

18. Write a program to implement a circular queue using linked list.

19. Write a program to create a binary search tree using link representation and display the elements in preorder, in order and post order using recursive function.

20. Write a program to create a binary search tree using link representation and
    i) search
    ii) delete an item from the binary search tree.

Covering paper 2.2 - 30 Marks (Internal 6 marks)

Each student should do at least 10 assignments from the following list.

1. Create Multiple Ledger of the following Account Heads :
Bank Charges ; Basic Pay ; Bonus ; Bonus Paid ; Business Promotion Expenses ; Commission Paid ; Conveyance ; Depreciation on Air Conditioner ; Depreciation on Building ; Depreciation on Computers ; Depreciation on Furniture & Fixtures ; Depreciation on Motor Car ; Depreciation on Plant & Machinery ; Discount ; Donation ; Electricity Charges ; Employers Contribution to Provident Fund ; Freight Outward ; Insurance Premium ; Interest Due ; Interest & Finance Charge ; Interest on Bank Overdraft ; Interest on Partner's Capital A/c ; Interest on Unsecured Loans ; Legal Fees ; Miscellaneous Expenses ; Office Rent ; Office Repairs & Maintenance ; Printing & Stationery ; Rent ; Rent Due ; Travelling Expenses.

2. Make necessary entries in Tally in the books of Galaxy Enterprise :
  (a) Introduced Cash Rs 10,00,000 , Furniture worth Rs1,00,000 , Computer worth Rs 86,000 , Machinery Rs 1,20,000 into the business on 1st Jan,2010
  (b) Opened a Current A/c with Bank of Baroda with Rs 1,00,000 on 2nd Jan,2011
  (c) Purchased goods on 6th Jan,2010 from Sridhar Stores on credit Rs 2,25,000
  (d) Sold goods for Cash Rs 1,20,000 to Maitree Stores on 7th Jan,2010
  (e) Sold goods to Sankar on credit for Rs 34,000 on 9th Jan,2010
  (f) Paid Rent advance Rs 25,000 by Cheque No 345671 on 10th Jan,2010
  (g) Withdrew from bank Rs 5,000 for office expenses on 18th Jan,2010
  (h) Purchased stationery items on 22nd Jan , 2010 for office use from Radhika Stationeries for Rs 1,500
  (i) Received Advance from Jagat for supply of goods worth Rs 12,000
  (j) Paid salary to office staff Rs10,000 by Cheque 345672 on 31st Jan, 2010

3. Make Data Entries for the following transactions :
  (a) Withdrew Rs 1,00,000 cash from SBI on 6th Jan ,2011
  (b) Deposited Rs 40,000 in HDFC Bank on 9th jan ,2011

(c) Transferred Rs 20,000 from HDFC Bank to SBI on 12th jan , 2011

(c) Transferred Rs 20,000 from HDFC Bank to SBI on 12th jan , 2011

(d) Paid Rs 4,300 as Insurance charges through HDFC Bank on 18th Jan , 2011

(e) Received Rs 3,25,000 from ABC Co. Ltd. On 23rd Jan , 2011 against our sales through Cheque and it has been deposited in SBI

(f) Sales worth Rs 5,50,000 made on credit to Vikas Group on 29th jan,2011

(g) Provision towards Employers PF Contribution Rs 78,000 made on 31st jan,2011

(h) Purchased Machinery Rs 1,00,000 from Sunder Enterprise (INPUT VAT 12.5%)

4. *Enter the following transactions in Tally in the books of Computer Solutions :*

(a) Purchased on 8th April , 2009 HCL Celeron 15 Nos @ Rs 14,000 ; HCL PIV 15 Nos @ Rs 21,000 from Next Generation Systems (Input VAT @ 4%)

(b) Sold on 10th April , 2009 to Fortune Computer Services 10 Nos HP Laserjet Series 1010 @ Rs 12,000 (Output VAT @ 12.5%)

(c) Received from Fortune Computer Services Rs 80,000 on 25th April , 2009

(d) Paid to Next Generation System Rs 2,00,000 vide Cheque No 357602 of HDFC Bank

5. *Record the following transactions in Tally in the books of Hind Computers :*

(a) Returned one Wireless Keyboard Rs 250 to Super Buzz (Input VAT 4%) on 13th August , 2010

(b) Returned from Computer Junction BM PIV Rs 500 on 16th August , 2010 (CST 4%)

(c) Transferred 10Nos CD ROM Disks (1 Box @ Rs 265/Box) from Stores to Defective Goods Stores on 31st August , 2010

6. *Prepare a Cash Book from the books of ABC Enterprise :*

(a) Cash Balance on 1st April 2010 Rs 4,00,000

(b) Opened a Current Account with UCO Bank on 5th April , 2010 with Rs16,000

(c) Purchased goods for Cash Rs 2,50,000 on 6th April , 2010

(d) Sold goods for Cash Rs 1,25,000 on 8th April , 2010

(e) Paid for Travelling Expenses Rs 2,300 on 10th April , 2010

(f) Paid for Staff Welfare Rs 1,200 on 16th April , 2010

(g) Introduced Additional Capital Rs 50,000 on 20th April , 2010

(h) Withdrew from Bank for Office Cash Rs 2,000 on 27th April , 2010

(i) Sold goods for Rs 65,000 on 28th April , 2010 and payment received by Cheque 15,000 and balance in Cash

7. *Prepare a Double Column Cash Book from the following transactions of XY Ltd :*

(a) On 1st Jan, 2010 Cash in Hand Rs 5,00,000 and Cash at SBI Rs 2,30,000

(b) On 4th Jan, 2010 Goods purchased for cash Rs 1,24,000

(c) On 8th Jan, 2010 Goods sold for cash Rs 2,25,000

(d) Deposited into SBI an amount of Rs 1,10,500

(e) Paid rent to landlord Rs 24,000 by Cheque no 234675

(f) Withdrew from SBI Rs 30,000 for purchase of Furniture

(g) Received payment of Rs 30,000 from Amit Kothari, a customer by Cheque

(h) Withdrew from SBI Rs 23,000 for office cash

8. Make relevant Voucher Entries from the following transactions :

    (a)   On 1st April, 2010 India Infotech received a Bill (vide No. 001) from Pheonix Agencies for Rs. 5,00,000 towards the Advertisement services rendered.

    (b) On April 8, 2010, payment of Rs. 4,95,000 is made towards bill no. Bill-001 to Pheonix Agencies for the purchase of Advertisement services, vide cheque no. 254781

    (c) On May 6, 2010, Universal Infotech, paid TDS of Rs. 5,000 towards Advertisement Expenses, vide cheque no. 056330 for the month of April, 2010.

9. Show how would you deal with the following Bills in Tally :

    (a) On 7th May, 2010, India Infotech received a bill (vide no. 911) from Gautam Bishnu & Associates for Rs. 1,12,360 inclusive of other charges of Rs. 12,360 towards the auditing services provided(TDS Rs10,000)

    (b) On 8th May, 2010 India Infotech received a bill (vide No. 696) from Digitech Computers for Rs. 25,000 towards commission charges.

    (c) On 12th May, 2010 India Infotech received a bill (vide No. 874) from Digitech Computers for Rs. 40,000 towards commission charges.

    (d) On 14th May, 2010 India Infotech deducted tax Rs 2,500 towards Commission Expenses for the transaction dated 8th May and Rs 4,000 towards transaction dated 12th May.

10. Prepare a Bank Reconciliation Statement of Digitech Solutions on 31st December, 2010

    (a) Balance as per Bank Book on 31st Dec,2010 Rs 32,000

    (b) Cheque deposited into UBI Rs 13,000 on 27th Dec , 2010 cleared by bank on 31st Dec ,2010 omitted to be recorded in Cash Book

    (c) Withdrew from UBI Rs 2,000 for office cash on 28th Dec,2010 but omitted to be recorded in Cash Book

    (d) Service Charge debited by UBI Rs 200 not credited in Cash Book

    (e) Bank Interest Rs 568 credited by UBI not recorded in Cash Book

    (f) Dividend from UTI Rs 12,450 credited by UBI not recorded in Bank Book

    (g) Direct deposit by Ravi, a customer Rs 3,400 into our UBI A/c not recorded in Cash Book

11. Choose the Correct Answer :

(i) What kind of procedure is used while operating the key F1 ?

    (a) ALT and F1

    (b) CTRL and F1

    (c) SHIFT and F1

    (d) F1

(ii) By default how many Groups and Ledgers does Tally have ?

 (a) 22 Groups and 2 Ledgers

 (b) 28 Groups and 3 Ledgers

 (c) 28 Groups and 2 Ledgers

 (d)) 26 Groups and 3 Ledgers

(iii) To toggle back to the 'Main Area' , the short cut key is
(a) CTRL and M (b) CTRL and A (c) CTRL and I (d) CTRL and N

(iv) Ledger Menu comes under
    (a) Accounts Info
    (b) Inventory Info
    (c) Accounting Vouchers
    (d) Inventory Vouchers
(v) To change the current period press
    (a) F1
    (b) ALT and F1
    (c) F2
    (d) ALT and F2

12. Fill in the Blanks :
    (a) To display the 'Change Voucher Type' press ----------------
    (b) The shortcut key to view detailed 'Profit & Loss A/c' is ------------------
    (c) To record the Voucher in 'Sales' press --------------
    (d) To shut an Activated Company press --------------
    (e) The shortcut key used to get the 'Stock Journal Voucher' screen is -------------

13. Show relevant Voucher Entry in Tally :
 (a) You have purchased an item at a rate of Rs.100 on 8th April , 2010 however by
     mistake your supplier had billed you at a rate of Rs.95. Now your supplier issues a
     debit note for balance of Rs. 5 plus vat and other applicable duty Rs 6.
 (b) You have agreed to pay a purchase invoice of Rs 1,00,000 within 1 month time to
     your supplier Geeta Stores. However, you couldn't manage to pay and your supplier
     agreed for a delayed payment at an interest rate of @2. p.m. for the same

14**.** The total gross salary payable by X Ltd for the month of January 2010 is Rs. 3,00,000.

Out of above, basic salary which is eligible for Provident Fund contribution @ 12% is Rs.

2,00,000. X Ltd is also required to pay a sum @12% from the basic salary before the same

is disbursed to employee. Apart of this, it is also required to pay @1.61% (of basic pay

)additional amount as per below :

@1.10% towards PF administration fees ; @0.50% towards Employees Deposit linked

insurance scheme and @0.1% towards EDLI administration charges.

Show how you would record the above transactions in Tally.

15. BX Ltd purchased a machinery for Rs 5,00,000. To use this machine company
requires a platform, pipe connections, electrical connections, fabrication works etc. at the
cost of Rs. 1,00,000. On the expense of Rs. 1,00,000 tax to be deducted at source. The

Company made a contract with Arun Contractors for electrical and fabrication work. On 10-8-2010 BX Ltd received bill for Rs. 60,000 from Arun contractors towards electrical and fabrication work. *Record the above transaction in Tally.*

Covering paper 2.4 - 30 Marks (Internal 6 marks)

Each student should do at least 6 assignments from the following list.

Objectives:

The Practical introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like Windows OS, LINUX OS, device drivers. Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, Using wildcards In addition hardware and software level troubleshooting process, tips and tricks would be covered.

Different ways of hooking the PC on to the network and internet from home and workplace and effectively usage of the internet. Configuring the TCP/IP setting. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Basic commands in Linux

Task 6: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Task 7: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 8: The test consists of various systems with Hardware / Software related troubles, Formatted disks without operating systems. Installation of antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LABORATORY 3.5

Covering paper 3.1 - 30 marks (Internal 6 marks)

Each student should do at least 12 assignments from the following list.

1. Write a program to create a child process that starts looping and then terminates.

2. Write a program to Show that the child can be set up to ignore a signal from its parent.

3. Write a program to Show that a process can ignore a signal.

4. Write a program to Create a thread in which prints "We are proud to be Indians" and terminates.

5. Write a program to demonstrate how to "wait" for thread completions by using the Pthread join routine. Threads are explicitly created in a joinable state.

6. Write a program to create a thread in which print "We are proud to be Indians" and pass multiple arguments using structure during its creation.

7. Write a program to compute the dot product of two vectors.

8. Write a program to compute the dot product of two vectors and also show the use of mutex variables.

9. Write a program to create threads, the main thread creates three threads. Two of these threads increment a counter variable while third thread watches the value of the counter variable. When the counter variable reaches a predefined limit, the waiting thread is signaled by one of the incrementing threads. The waiting thread "awakens" and then modifies the counter. The program continues until the incrementing threads reach a final value and also print the final value.

10. Write a program to fork() a child process so that we have two processes running: Each process communicates via a semaphore. The respective process can only do its work (not much here) When it notices that the semaphore track is free when it returns to 0. Each process must modify the semaphore accordingly.

11. Write a program to show how 2 processes can talk to each other using kill() and signal(). We will fork() 2 process and let the parent send a few signals to it's child.

12. Write a program to show attaching and detaching shared memory.

13. Write a program to show the communication between two processes through shared memory.

14. Write a program to implement Banker's Algorithm.

15. Write a program to simulate synchronization of Sleeping Barber problem.

16. Write a program to simulate Dining Philosophers Algorithm.

Covering Paper 3.3 - 35 Marks (Internal 7 marks)

Each student should do at least 6 assignments from the following list.

1. Create a table *Employee* with the following columns:
        Emp_no (numeric) primary key
        Emp_name (string)
        Join_date (Date)
        Basic_pay_fixed_at (numeric)
        Date_of_birth (Date)

Insert the following data into the table.

Emp_no.	Emp_name	Join_date	Basic_pay_fixed_at	Date_of_birth
1001	Charles Babbage	01-Jun-2000	8000.00	03-10-1973
1002	George Boole	01-Jul-2001	5000.00	04-12-1972
1003	E.F. Codd	01-Jun-2001	8000.00	06-03-1969
1004	Bill Gates	01-Jul-2003	5000.00	09-10-1995
1005	Tony Greig	01-Aug-2004	8000.00	04-05-1985

2. Create the following two tables and insert data into the tables.

 Player (Roll no.→Primary Key)

Roll no.	Name
10	Vijay Amrithraj
20	Leander Paes
30	Mahesh Bhupathi
40	Sania Mirza

Match (Match_no→Primary key,Roll no→Foreign key)

Match_no	Roll_no.	Match_Date	Opponent
1	20	10-Jul-2008	Washington
2	30	12-Jan-2008	Sampras
3	20	12-Aug-2008	Borg

4   30   20-Mar-2008   Vijay
Perform the following two operations:
        (i) Perform EQUIJOIN operation to retrieve data from both the files.
        (ii) Perform OUTERJOIN operation to retrieve the unmatched records.
3. Design an ER diagram for a *BANK* database schema. To consider that each Bank can have multiple branches, and each branch can have multiple Accounts and Loans for customer. Also to specify the non weak & weak entity types, key attributes & key types, relationship types, instances, constraints and participations.
3. Create a table *Student* taking the attributes given bellow

        Roll_no, Student_name, Address, Date_of_addmission, Class
        Section and Contact_no.
 Write appropriate queries to perform the following operations:
        a) To insert values in the Student table.
        b) To delete values from Student table
        c) To list the names of all students which roll_no > 20.
        d) To search for students who got admitted before 01-01-2006.
        e) To change the name of the student whose roll number is 10 to Amar.
4. Create tables *Department* and *Employee* with the attributes given bellow.

        Employee (EmpNo , Empname, Address, Dno)
        Department (Dno, Dname, Location)

    Dno in Employee is a foreign key.

    Write appropriate queries to perform the following operations:

        a) To insert values in the tables.
        b) To retrieve the names and addresses of all Employees working in the Finance
            department.
        c) To print the location where Administration department is located.

        d)   to delete all information regarding a particular employee.
5. Create table *Student* and *Course* taking the attributes given bellow.

        Student (Roll_no, Name, Semester, Course_no(Foreign key))
        Course (Course_no, Course_name)
    Write appropriate queries for the following operations:
        a) To retrieve names of all students who are admitted to the course 'BCA'.
        b) To retrieve the names of all students whose course name is 'BCA' and who
    are in the 3rd semester.
        c) To display details of all courses in which more than 100 students got admitted.
        d) For course being offered, display the course name and number of students
    admitted to the course.
6.   Create tables *Employee*, *Department*, *Location*, *Works_on*, and *Project* taking
    the attributes given bellow.

Employee (Fname, Lname, Empno, Bdate, Address, Salary, Dnumber)
Department (Dname,Dnumber,Mgrno)
Locations(Dnumber, DLocation)
Works_on(Empno, Pnumber, Hours_per_day)
Project(Pname, Pnumber, Location,Dnumber (Foreign))
Dependent(Empno, Dependent_name, Sex, DOB, Relationship)

Write appropriate queries for the following operations:

a) Retrieve the names and addresses of all employees who work in the Finance department.
b) To retrieve the names of all employees who works on all the projects controlled by department number 6
c) For each department, print the name of the department and the name of the manager of the department.
d) Retrieve the location where the Administration department is located.

---

e) For every project located in Mumbai list the project number, the controlling department and department manger's name and address.
f) Find out how many employees are there in each department.
g) Find the total salary of all employees of the "Research" department, as well as the maximum, minimum and average salary in this department
h) Retrieve the name of all employees who have no dependent.
i) Alter the "Employee" table by deleting the coloumn Bdate.
j) Retrieve the Fname, Lname of all employees whose salary is higher than average salary.
k) For each department retrieve the department number, the number of employee in the department and their average salary.
l) Retrieve the name of all employees who have two or more dependent
m) Retrieve the details of all employees who works on project number 1,2,3

7.   Create Table

Client_master (Client_no, name, address, Bdue)
Product_master(P_number,Description,saleprice,costprice)
Sales_master(Salesmno,Sname,Addres,Salamnt,Remarks)
Sales_order(O_no,Client_no,Odate,Delyaddr,Salesmno)
Sales_order_detail(Order_no,Product_no, Qtyorder, product_rate,Qty_dispatched)

Write appropriate queries to perform the following operations:

i) List name of all clients having 'a' as the second letter in their names.
ii) Retrieve the description and total Qty sold for each product.
iii) Find product no. and description of non moving products (i.e product not being sold).
iv)For each product being sold, list the product number and the total amount (in Rs.) sold.

v) List all client who stay in 'Bangalore' or 'Mumbai'

vi) List the clients who stay in a city whose First letter is 'M'

vii) Find the names of clients who had purchased the item 'Trouser'.

viii) Find out if T-Shirt' has been ordered by any client and if so print the details of the client.

ix) List details of all products whose unit price is more than Rs. 5000.00.

x) Calculate the total amount (in Rs.) purchased by each client that has purchased items amounting more than Rs. 20000.

8. Create table

Author(Author_id, Name, City, Country)
Catalog (Book_id, Title, Author1_id, Author2_id, Publisher_id, Category_id, Year, Price)
Publisher(Publisher_id, Name, City, Country)
Order_details(Order_no, Book_id, Quantity)
Category(Category_id, Description)
Order_summary(Order_no,Member_id,Odate,Amount,Ostatus)
Member(Member_id, Name, Address, Contact)
Assume that all books have at most two authors.

Write appropriate queries to perform the following operations:

a) Retrieve the title, author, and publisher names of all books published in 1999 and 2006.

b) Retrieve the title of all books whose one author is 'A Tanenbum'.

c) Get the details of all books whose price is greater than the average price of the books.

d) Get the names of all the books for which an order has been placed.

e) Get the names of all authors who have more than ten books in the catalog.

f) Get the details of the authors whose books are being sold from the book club.

g) Get the title and price of all books whose price is greater than the maximum of the category average.

Covering paper 3.4 - 35 marks (Internal 7 marks)

Each student should do at least 12 assignments from the following list.

1. Define a class named *triangle* to represent a triangle using the lengths of the three sides. Write a constructor to initialize objects of this class, given the lengths of the sides. Write member functions to check
   (a) if a triangle is isosceles
   (b) if a triangle is equilateral.
   Write a main function to test your functions.

2. Define a structure **employee** with the following specifications.
   Empno: Integer
   Ename: 20 character

Basic, hra, da: float

Calculate() : a function to compute net pay as basic+hra+da with float return type.

Getdata(): a function to read values for empno, ename, basic, hra, da.

Dispdata(): a function to display all the data on the screen

Write a main program to test the program.

3. Define a class *circle* to represent circles. Add a data member *radius* to store the radius of a circle. Write member functions area() and perimeter() to compute the area and perimeter of a circle.

4. Define a class *complex* with two data members *real* and *imag* to represent real and imaginary part of a complex number.

   Write member functions

   rpart(): to return the real part of a complex number

   ipart() : to return the imaginary part of a complex number

   Add() : to add two complex numbers.

   Mul() : to multiply two complex numbers.

   Write constructors with zero, one and two arguments to initialize objects.

   // This is an example of polymorphism.

5. Define a class *point* with two data members *xordinate* and *yordinate* to represent all points in the two dimensional plane by storing their x co-ordinate and y co-ordinate values.

   Write member functions

   dist(): to return the distance of the point from the origin.

   slope(): to return the slope of the line obtained by joining this point with the origin.

   Write constructors with zero, one and two arguments to initialize objects.

   Write a friend function to compute the distance between two points.

6. Define a class *String* with the following data members

   char *p;

   int size

   and write member functions to do the following (without using library function) and using dynamic memory allocation.

   - Length of the string
   - Compare two string
   - Copy one string to another.
   - Reverse the string.
   - Write suitable constructors and destructors. Write a copy constructor for the class.

7. For the class *complex* defined in 3 above, overload the <<, >>, + and * operators in the usual sense. Also overload the unary – operator.
8. For the class *string* defined in 5 above, overload the <<, >> and + operators where + is to be used for concatenating two strings.
9. Define a class *time* to store time as hour, minute and second, all being integer values. Write member functions to display time in standard formats. Also overload the ++ and -- operators to increase and decrease a given time by one second where the minute and hour values will have to be updated whenever necessary.
10. Define a class to store matrices. Write suitable friend functions to add and multiply two matrices
11. Write a program to show the implementation of static members using class.

12. Define a class *student* with the following specification:
                 rollno   :integer
                 sname   :20 characters

     Derive two classes *artsst* and *scst*. The class astst will represent students belonging to Arts stream and the class scst will represent students belonging to science stream. The artsst class will have additional data members *ph, hs, en* and **as** to store marks obtained by a student in three subjects Philosophy, History, English and Assamese. The class scst will have additional data members *ph, ch, ma and eg* to store marks obtained in Physics, Chemistry, Mathematics and English.

     Write the following member functions in the classes artst and scst

                 ctotal()   : A function to calculate the total marks obtained by a student

                 takedata()   : function to accept values of the data members

                 Showdata()   :   function to display the mark sheet of a student
                 .
13. Define an abstract base class *printer*. Derive three classes, *laser-printer, dmp, line-printer* and *ink-jet-printer*. The derived classes will have data members to store the features of that particular printer. Write pure virtual function display() in the base class and redefine it in the derived classes.
14. Define a abstract base class *figure* and add to it pure virtual functions

         display() to display a figure
         get() to input parameters of the figure
         area() to compute the area of a figure
         perimeter() to compute the perimeter of a figure.
Derive three classes *circle, rectangle* and t*riangle* from it. A circle is to be represented by its radius, rectangle by its length and breadth and triangle by the

lengths of its sides. Write a main function and write necessary statements to achieve run time polymorphism.

15. Write an interactive program to compute square root of a number. The input value must be tested for validity. If it is negative, the user defined function *my_sqrt()* should raise an exception.

16. Define a class *rational* to store rational numbers as a pair of integers, representing the numerator and denominator. Write a member functions for setting the values of the numerator and denominator. This function should raise an exception if attempt is made to set a zero value as the denominator and in such cases it should be set to 1.

17. Write a class template for storing an array of elements. Overload the << and >> operators. Write a member function to sort the array in descending order.

18. Write a class template for representing a singly linked list. Write functions for inserting, deleting, searching and for displaying a linked list. Write a main function to test it on a linked list of integers and characters.

LABORATORY 4.5

Covering paper 4.1 - 40 marks (Internal 8 marks)

Each student should do at least 8 assignments from the following list.

1. Write a program to add two 8 bit numbers & store it in a memory location 8820h.

2. Write a program to copy a block of memory from one location 8820h to another location 8840h.

3. Write a program to perform the addition of two 16 bit numbers.

4. Write a program to add two numbers & store it in a register **e**.

5. Write a program to load two unsigned numbers in register b & c. Subtract b from c. If the result is in 2's complement, convert the result in absolute magnitude & display it.

6. Write a program to find the difference of two numbers & store the result in a memory location 8830h.

7. Write a program to find the larger / smaller of two given numbers.

8. Write a program to subtract two numbers and add it to a given memory location.

9. Write a program to perform x+y–5,where x and y are 16–bit numbers.

10. Write a program to find 2's complement of a number.

Covering Paper 4.2 - 20 Marks (Internal 4 marks)

Each student should do at least 3 assignments from the following list.

1. Xpaize.com wants to computerize its sales, purchase & booking of shares through online mode . A user enters his/her user name and password (assigned at the time of registration).
   User chooses one of the above actions and finally receives the trasaction/account

details on the action chosen.
Perform the following tasks for the above problem.
a) Develop SRS.
b) Draw DFDs of level 0 and level 1.
c) Draw an ER diagram and its related tables.

2. The university wants to computerize its admission process. The system should maintain data of all new students as well as old students , their results issue admission letter , allocate study centre or should also allow students to move from one centre to another study centre.
Perform the following tasks for the above problem.
d) Develop SRS.
e) Draw DFDs of level 0 and level 1.
f) Draw an ER diagram and its related tables.

3. A Tic – Tac - Toe is a computer game in which human player and computer makes alternative moves on a 3X3 square. A move consists of marking a previously unmarked square. The player who is first to place three consecutive marks along a straight line (ie along a row , column or diagonal) on the square wins . As soon as the either of the winner wins a message congratulating them is displayed .If neither of the player manages to get three consecutive marks along a straight line and all the squares on the board are filled up , then the game is drawn. The computer always tries to win a game.
   Perform the following tasks for the above problem.
a) Draw DFDs of level 0 and level 1.
b) Draw an ER diagram and its related tables.

4. A supermarket needs to develop the following software to encourage regular customers. For this the customer needs to supply his /her residence address ,telephone number & the driving licence number.Each customer who is registered for this scheme is assigned a unique customer number (CN)by the computer. Based on the generated CN a clerk manually prepares a customer identity card after getting market managers signature on it . A customer can present his customer identity card to the check out staff whenever he makes any purchases.In this case the value of his purchase is credited against his CN.At the end of each year the supermarket intends to award surprise gifts to ten customers who make the highest total purchase over the year.Alsp it intends to award a 22 caret gold coin to every customer whose purchase exceeded Rs.

10,000. The entries against the CN are reset on the last day of every year after the prize winner liat are generated.

Perform the following tasks for the above problem.

c) Draw DFDs of level 0 and level 1.

d) Draw an ER diagram and its related tables.

Covering Paper 4.3 - 40 Marks (Internal 8 marks)

Each student should do at least 8 assignments from the following list.

1. Design a class to represent a bank account and include the following data members –

   Data Members: name of the depositor, account number, type of a/c, balance amount in

   the a/c

   Methods: to assign initial values, to deposit an amount, to withdraw an amount after checking the minimum balance (Rs.1000), to display the name of the depositor and balance.

2. Write an applet programming to print the first name, last name, sex, address, mobile no. and pin code of an end user passing parameters.

3. Write an applet programming to create three buttons and draw a rectangle on clicking the first button, a solid rounded rectangle on clicking the second button and a solid circle and an arc on clicking the third button.

4. Write a program to create 3 – threads for execution with different priorities.

5. Write a program to create three threads for execution of the natural nos. less than 5 using synchronization concept.

6. Write a java program for a class teacher that contains two fields name and qualification. Extend the class to department that contains data members deptno and deptname. An interface name as college contains one field name of the college. Using the above classes and interface get the appropriate information and display them.

7.   Design three classes person, employee and student using the concept of inheritance. Each class should have a constructor of its own properties as name, age, gender and common method showdata().

8.   Write a program to create an array of employee name and salary related to the employee. If the salary is greater than Rs.10,000 raise an exception "Salary is greater than Rs.10,000", otherwise display the required information.

9.   Design a user interface to insert, update, delete, search and browse a record of employee database for emp_id, emp_name, sex, basic, desig and date_join.

10.   Design a menu as Operation and Exit. The Operation menu contains the menu items as Addition, Subtraction, Multiplication, Division and Remainder of two numbers. On clicking the respective menu items perform the desired operation. Further on clicking the Exit menu put a confirmation message as "Do you want to exit-Yes/No?". If Yes then terminate the application, otherwise it exists.

LABORATORY 5.5

Covering Paper 5.2 - 40 Marks (Internal 8 marks)

HTML

(At least 17 assignments has to be done from this group)

1. Create a HTML document consisting of HTML heading, paragraphs and images.

2. Create a HTML document and insert comments in the HTML source code and insert horizontal lines.

3. Construct HTML document to set the font of a text , size of the font, style of the font.

4. Create a HTML document to show how to create hyperlinks.

5. Create a HTML document to use an image as a link.

6. Create a HTML document to open link in a new browser window.

7. Create a HTML document to jump to another part of a document (on the same page).

8. Create a HTML document to insert images from another folder or another server.

9. Create an image-map, with clickable regions.

10. Create a HTML document with all table elements (Table, Caption, Table Row, Table Data element, Table Heading Element, THEAD, TFOOT, TBODY)

11. Create HTML document to make an unordered list, an ordered list, different types of ordered lists, different types of unordered lists, Nested list, Definition list.

12. Create HTML form with the all FORM elements (text fields, password field, Checkboxes, Radio buttons, Select elements, Drop-down list with a pre-selected value, Textarea (a multi-line text input field) and buttons.

13. Create HTML document with all Frame elements (FRAMESET, FRAME, NOFRAMES, and INLINE FRAME).

14. Create a HTML document to add AUDIO and VIDEO.
15.. Create a HTML document to aligning images
    (Let the image float to the left/right of a paragraph)

16. Create a HTML document to jump to a specified section within a frame

17. Construct a HTML document with CSS to Set the background colour of a page.
18. Construct a HTML document with CSS to set an image as the background of a page
19. Construct HTML document with CSS to Set the text color of different elements and align the text.

20. Construct HTML document to set different colours to visited/unvisited links, Specify a background colour for links

XML

21. Construct an XML document that contain information about products of an organization.
22. Construct an XML document that contain information of 5 students (such as roll no., name , address, class).
23. Construct an XML document that contain details of 10 books.

JAVAScript

(At least 10 assignments has to be done from this group)

24. Write a program in javasrcript to accept a name from the user and display the same name in an alert box.
25. Write a program in javasrcript to display a message in a confirm box.
26. Write a program in javasrcript to display the message 'time is running out' in the status bar.
27. Write a program in JavaScript to enter marks of a student and find his/her grade according to the following:
     if marks>=90 then grade A
     if marks>=80 then grade B
     if marks>=70 then grade C
     if marks>=60 then grade D
     else fail.
28. Write a program in JavaScript to create a button and when the button is clicked the message 'Hello World' is displayed on an alert box..
29. Write a program in JavaScript to accept 2 nos from the user and show the working of all arithmetic operators.
30. Write a program in JavaScript to accept 2 strings and concatenate them.
31. Write a program in JavaScript to display the current date and time.
32. Write a program in JavaScript to find the length of an array.
33. Write a program in JavaScript to check whether a string is palindrome or not.
34. Write a program in JavaScript that responds to a mouse click anywhere on the page (using mouse click).
35. Write a program in JavaScript to display the contents of a check box in a alert box.

36. Write a program to validate a form in the user id and password forms.

37. Write a program in JavaScript to crate a welcome cookie, Button animation, Image map with added JavaScript
Simple timing, Timing event in an infinite loop

VBScript

(At least 6 assignments has to be done from this group)

38. Write a program in VBScript to create a variable.
39. Write a program in VBScript to uppercase to lowercase.
40. Write a program in VBScript to Create an array
41. Write a program in VBScript using conditional statements loop
42. Write a program in VBScript using loop.
43. Write a program in VBScript to display Date and Time
44. Write a program in VBScript to display the current month and day.

ASP

45. Write a program in ASP to interact with a user in a form that uses the "get" method.
46. Write a program in ASP to interact with a user in a form that uses the "post" method.
47. Write a program in ASP to interact with a user in a form with radio buttons.
48. Write a program in ASP to create a welcome cookie.

Covering Paper 5.3 - 35 Marks (Internal 7 marks)

Each student should do at least 4 assignments from the following list.

Avoid using Loopback Communication for the assignments,1-4:

1. Write a server socket program using TCP/IP in java where the client side will send a request for an existing file to the server side and if the file exists in the server then send the contents of that particular file to the client in reply, otherwise display a message "file does not exist on the server", if exists displays the contents on the client side.

2. Develop a chat application using TCP/IP in java.

3. Develop a client-server application using TCP/IP in java to input user's information and finally send them to the server and store there in a file.

4. Develop a server socket program where the client takes principal, rate of interest and number of years and send them to the server. In the server receive this information and find the simple interest and finally send the result to the client again and display it on the client's VDU.

5. Configure a Local Area Network (Wired/Ethernet) in Linux environment. Configure the network interface card using ifconfig command and also explore ping, ifdown and ifup commands.

Covering Paper 5.4 - 25 Marks (Internal 5 marks)

Each student should do at least 12 assignments from the following list.

1. Write a program to find the positive root of the equation $2x - \log_{10} x - 7 = 0$, correct to 4 places of decimals using N-R method.

2. Write a program to find $3x - \cos x - 1 = 0$ that lies between 0 and 1, correct to 4 places of decimal by using Bisection method.

3. 3. Write a program to find the root of the equation $x\, e^x - 3 = 0$ that lies between 1 and 2 correct to 4 places of decimal by using Regula-Falsi method.

4. Implement Euler's method.

5. Implement R-K method.

6. Implement Simpson's method.

7. Write a program to find mean for direct series.

8. Write a program to find mean for continuous distribution.

9. Write a program to find median for individual series.

10. Write a program to find median for direct series.

11. Write a program to find median for continuous series.

12. Write a program to calculate lower quartile.

13. Write a program to calculate upper quartile.

14. Write a program to calculate different deciles.

15. Write a program to calculate different percentiles.

16. Write a program to calculate mode for discrete distribution.

17. Write a program to calculate mode for continuous distribution.

18. Write a program to calculate harmonic and geometric means for any distribution.

19. Write a program to calculate probability using binomial distribution.

20. Write a program to calculate probability using Poisson distribution.

Practical Assignment List related to the practical part of paper 6.3
Total marks - 50 (Internal 10 marks)

Each student should do at least 15 assignments from the following list.

1. Installation of Linux Operating System and partitioning the disk.
2. Installing software packages in linux OS using GUI as well as command line.
3. Changing the default run level of a system
4. Mounting and un mounting a removable media.
5. Finding the list of all running processes and redirect the output in a file.
6. Use of different kill signals to kill a running process.
7. Bringing a process from back ground to fore ground and vice-versa.
8. Adding and managing user accounts.
9. Monitoring disk space quota and memory usage and redirect the output in a file.
10. Backup and restoring a file.
11. Compression and extracting a file. Use command line.
12. Configuring a network interface and assigning a default route.
13. Scheduling job using crontab.
14. Changing the ownership and access permission of file or directory. Use command line.
15. Copy, move and rename a file.
16. Configuring a ftp server
17. Assigning address of DNS.
18. Use of ssh, telnet, netstat, ping, route commands.
19. Use grep, awk, sed commands.
20. Use of redirection and piping.
21. Monitoring and managing system log infomation.
22. Basics of firewall using iptables.
23. Basics of configuring http server.
24. Managing different services in linux.
25. Monitoring the traffic going through a network interface.
26. Write shell script to
    a. Find factorial of a given number
    b. Convert a decimal number to hexadecimal number

Practical Assignment List related to the practical part of paper 6.1.3
Total 50 marks (Internal 10 marks)

Each student should do at least 12 assignments from the following list.

1. Develop an application with a form and two buttons such that on clicking the button "Enlarge' a bigger circle will be displayed on the form and on clicking the button 'Shrink' a smaller circle will be displayed on the same form.

2. Develop an interactive Interest calculator application that takes Principal amount (P), Rate of Interest ®, and Number of years (N) through textbox input and displays Simple Interest, Compound Interest and Difference between Simple and Compound Interest.

3. Create a digital calendar to display date in the format DD::MM::YYYY and time in the 12-hour format HH:MM:SS AM/PM.

4. Develop an application using pop-up menus where there will be five menus with each menu item having two sub-menus, and on clicking each sub-menu item a different form will be displayed.

5. Develop a simple audio player application.

6. Develop a simple video player application.

7. Develop an application showing the use of a slider such that integers 1,2,---10 will be displayed as the slider is moved.

8. Develop a simple text editor application.

9. Develop an application showing the use of all possible GUI components (textbox, list, drop-down menu, radio, etc.) for new bank account creation, and on submit display the entered data.

10. Develop the Tic-Tac-Toe game in GUI environment.

11. develop an application showing five different animations in five separate forms on the statement "Welcome to GUI Programming".

12. Develop an application using database connectivity (any convenient DBMS) to store and display complete student information of the department.

13. Develop an application using database connectivity (any convenient DBMS) to store and display complete book information for the departmental library.

14. Develop an application using database connectivity (any convenient DBMS) to store and display complete member information for a club.

15. Develop an application using database connectivity (any convenient DBMS) to manage and display complete accounts for the Freshmen Welcome Meet.

Practical Assignment List related to the practical part of paper 6.2.2
Total marks: 50 (Internal 10 marks)

Each student should do at least 4 assignments from the following list.

1. Consider the following relational schema for Library Database.

   BOOK (Bookid ,Title , Publishername)
   BOOK_AUTHORS (Bookid , Authorname)
   PUBLISHER (Name , Address , Phone)
   BOOK_COPIES (Bookid, Branchid, No_of _copies)
   BOOK_LOANS (Bookid ,Branchid,CardNo,Dateout ,Duedate)
   LIBRARY_BRANCH (Branchid,Branchname,Address)
   BORROWER (CardNo,Name,Address,Phone)

   Write a program segment that retrieves the list of book that became overdue
   yesterday & prints the book title and borrower's name for each. Use embedded SQL
   with JAVA or C as host language.

2. Write the appropriate SQL DDL statements for declaring the relational schemas for
   Library database .Specify appropriate keys & referential triggered action.

3. Specify the following views in SQL on the Company Database described below.

   EMPLOYEE (eno , fname,lname , initial , address ,sex , salary , supereno , Dno)
   DEPARTMENT (Dname , Dnumber , Mgreno , mgrstartdate)
   DEPT_LOCATIONS (Dnumber , dlocation)
   PROJECT (Pnumber , pname , plocation , Dnum)
   WORKS_ON (eeno ,dependent_name,sex,Bdate,relationship)

   a) A view that has the department name, manager name, manager salary for
      every department.
   b) A view that has the employee name, supervisor name & employee salary for
      each employee who works in 'Research department '.

4. Consider the relational schema. Suppose all the relations were created by user X,
   who wants to grant the following privileges to account A & B.
   a) Account A can retrieve or modify any relation except dependent can grant
      any of these privileges to other users.
   b) Account B can retrieve all the attributes of employee & department except
      for salary, mgreno and mgrstartdate.
   c) Write SQL statements to grant these privileges. Use views if required.

5. Create the Company data base using appropriate SQL DDL statements & insert data
to the tables. Consider all the referential integrity constraints .Verify your database with
the help of some queries.