GOA UNIVERSITY

SECOND YEAR OF BACHELOR'S DEGREE COURSE IN INFORMATION TECHNOLOGY
SCHEME OF INSTRUCTION AND EXMINATION (Revised in 2007-08)

SEMESTER III

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
IT 3.1	Applied Mathematics III	3	1	0	3	100	25	-	-	125
IT 3.2	Numerical Methods	3	0	2	3	100	20 + 5	-	-	125
IT 3.3	Analog & Digital Circuits	3	1	2	3	100	20 + 5	-	-	125
IT 3.4	Computer Organization & Architecture	3	1	2	3	100	20 + 5	-	-	125
IT 3.5	Data Structures using C	3	1	2	3	100	20 + 5	50	-	175
IT 3.6	System Analysis & Design	3	1	2	3	100	20 + 5	50	-	175
	TOTAL	18	05	10	-	600	150	100	-	850

L- Lectures, T- Tutorials, P- Practicals
Th-.Dur.- Duration of Theory paper, Th-Theory, S-Sessional, P- Practicals, O-Oral.
25 Sessional marks will be split as follows: 20 marks are for the Internal Test,
5 marks are for continuous evaluation of Practicals/Assignments

SEMESTER IV

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
IT 4.1	Discrete Mathematical structures	3	1	0	3	100	20 + 5	-	-	125
IT 4.2	Signals & Systems	3	1	0	3	100	20 + 5	-	-	125
IT 4.3	Computer Hardware & Troubleshooting	3	1	2	3	100	20 + 5	-	-	125
IT 4.4	Microprocessors & Interfacing	3	1	2	3	100	20 + 5	50	-	175
IT 4.5	Design & Analysis of Algorithms	3	1	2	3	100	20 + 5	-	-	125
IT 4.6	Object Oriented Programming System	3	1	2	3	100	20 + 5	50	-	175
	TOTAL	18	06	08	-	600	150	100	-	850

L- Lectures, T- Tutorials, P- Practicals

Th-.Dur.- Duration of Theory paper, Th-Theory, S-Sessional, P- Practicals, O-Oral.

25 Sessional marks will be split as follows: 20 marks are for the Internal Test,

5 marks are for continuous evaluation of Practicals/Assignments

IT 3.1 APPLIED MATHEMATICS – III

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Linear Algebra: Types of Matrices, Determinants, Adjoint inverse of Matrices, Elementary transformation, rank using elementary transformation, Canonical and normal form, system of equations $AX = B$ and $AX = 0$, linearly independent systems. (6 Hrs)

Eigen values, Eigen vectors, properties, similar Matrices, Cayley Hamilton theorem, Applications, Minimal polynomial, Diagonalization, function of Matrices (5 Hrs)

MODULE 2

Z-Transforms, Inverse, convolution, properties, Applications. (4Hrs)

Probability: Classical definition, Axiomatic definition, Sample space, events, Independent events, Conditional probability, theorem of total probability, Baye's theorem of probability. (7Hrs)

MODULE 3

Random variables: Discrete and Continuous distribution, density function, Marginal and conditional distribution, Stochastic independence. (4 Hrs)

Discrete probability distribution: Binomial, Multinomial, Poisson, Geometric and Hypergeometric. Continuous probability distribution: Uniform, exponential, Normal and Gamma. (4 Hrs)

Expectation: Expectation of function, Variance, moment generating function, Characteristic function.

(4 Hrs)

MODULE 4

Laplace Transforms, inverse, properties, convolution and application. (6Hrs)

Fourier Transforms, Inverse , convolution, properties, applications. (5Hrs)

TEXT BOOKS:

1. Applied Mathematics –III-By R. M. Baphana Technova Publication
2. Engineering Mathematics (for semester III) by T Veerajan, Tata MCGraw-Hill Publishing Company
3. Engineering Mathematics Voll-III P. Kandasamy S.Chand &Company

REFERENCE BOOKS:

1. A First Course in Probability by Ross. S, Collian Mac Millan, NewYork.
2. Probability and Statistics in engineering and Management Science by William W. Hines, John Wiley and Sons Publications
3. Advanced Engineering Mathematics by Kreyazig.
4. A Text Book of Matrices by Shanti Narayan, S. Chand and Company
5. Engineering Mathematics by C. N. Tembhekar & P.D.Shobhane, Das Ganu Prakashan
6. Theory and Problems in Matrices, Schaum outline series.
7. Engineering Mathematics, Vol. I & II, S.Chand and Company.
8. Theory & Problems of Probability and statistics by Murray R. Spiegel, Schaums outline series.
9. Introduction to Probability and Statistics by Seymour Lipschutz, Schaums outline series.

IT 3.2 NUMERICAL METHODS

Lecture Per week	: (3+ 0+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Introduction to Numerical Computing (3 Hrs)

Introduction, Numeric data, Analog computing, Digital computing, Process of numerical computing, Characteristics of Numerical computing, computational environment.

Approximations and Errors in Computing (3 Hrs)

Inherent errors, Numerical Errors, Absolute and Relative errors, Convergence of Iterative Processes

Solutions of Non-linear equations (3 Hrs)

Bisection Method, False Position Method, Newton Raphson, Secant method,

Direct solution of Linear Equations (3 Hrs)

Solution by Elimination, Basic Gauss Elimination method, Gauss Elimination with pivoting, Gauss – Jordan method

MODULE 2

Iterative Solutions of Linear Equations (3 Hrs)

Jacobi iteration method, Gauss Seidel method, Method of relaxation, convergence of iteration methods.

Interpolation (5 Hrs)

Linear Interpolation, Lagranges Interpolation Polynomial, Newton's Interpolation Polynomial, Divided difference table, Interpolation with Equidistant points.

Regression (3 Hrs)

Fitting Linear Equations, Fitting transcendental equations, Fitting polynomial function

MODULE 3

Numerical differentiation (5 Hrs)

Differentiating Continuous Functions, Differentiating Tabulated functions, difference tables, Richardson Extrapolation

Numerical Integration (6 Hrs)

Trapezoidal Rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Romberg Integration

MODULE 4

Numerical Solution of Ordinary Differential equations (6 Hrs)

Taylor Series Method, Euler's methods, Heun's Method, Polygon Method, Runge-Kutta methods

Numerical Solution of Partial Differential Equations (5 Hrs)

Deriving differential Equations, Elliptic Equations, Parabolic Equations, Hyperbolic Equations

TEXT BOOKS:

1. Numerical Methods by E. Balaguruswamy, Tata Mc Graw Hill.
2. Introductory Methods of Numerical Analysis by S. S. Shastry, PHI

REFERENCE BOOKS:

1. Numerical Algorithms by E.V. Krishnamurthy and Sen, PHI
2. Computer Oriented Numerical Techniques by Rajaraman, PHI
3. Numerical Methods in Engineering and Science by B.S. Grewal, Khanna Publications.

IT 3.3 ANALOG AND DIGITAL CIRCUITS

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)

Total Number of Questions to be answered : 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Number Systems and Codes1Conversions (binary to decimal and decimal to binary), Octal and hexadecimal numbers, Codes (ASCII, Excess-3, Gray), Error detection and correction codes.
Arithmetic Circuits Binary Addition & Subtraction, Unsigned binary numbers, 2's Complement Representation & Arithmetic, Adder-Subtracter. (4 Hrs)

Digital Logic: Binary Numbers, basic gates, Boolean algebra, Nor and Nand Gates, And or Invert Gates, De Morgan's theorem, Positive and Negative Logic. (3 Hrs)

Combination Logic Circuits Boolean laws/theorems, Sum of Products, Truth table, Pairs, Quads, and Octets, Karnagh mapping, Product of Sums Method and Simplification.
Data Processing Circuits Multiplexers, Demultiplexers, decoder, BCD to decimal decoder, 7-segmant decoder, encoders. (4 Hrs)

MODULE 2

Flip-Flops RS Flip-Flops, Gated Flip-Flops, Edge-Triggered RS, D, and JK Flip-Flops, Flip-Flop timing, JK Master-Slave Flip-Flops (4 Hrs)

Registers Types of Registers, Serial in-serial out, Serial in-parallel out, Parallel in-serial out, Parallel in-parallel out, Ring counters (3 Hrs)

Counters Asynchronous counters, Synchronous counters, changing the counter modulus, decade, and shift counters, A MOD-10 shift counter with decoding. D/A and A/D conversion Asynchronous counters, Synchronous counters, changing the counter modulus, decade, and shift counters, A MOD-10 shift counter . (4 Hrs)

MODULE 3

Op-amp – ideal characteristics – op-amp-as inverting amplifier – op-amp.as non-inverting amplifier – input offset voltage – input offset current – slew rate – Application – adder, subtractor, integrator, differentiator – unity gain buffer – comparator . Opamp as waveform generators. (5 Hrs)

Feed back amplifiers – types of feedback – gain with negative feedback – stability of gain – reduction of distortion – effect of feedback on input and output resistance – emitter follower – current series feedback amplifier – differential amplifier – differential mode gain of a differential amplifier – common mode gain – CMRR. (6 Hrs)

MODULE 4

Clocks and Timing Circuits Clock waveforms, TTL clock, Schmitt Trigger, 555 Timers (Astable, Monostable), Monostables with input logic. (6 Hrs)

Oscillators – Barkhansen criterion for oscillation – Hartley oscillator – Colpits' oscillator – phase shift oscillator astable multivibrator – Piezoelectric crystals – crystal oscillator. (6 Hrs)

Voltage Regulators: Definition, design and letter using IC 723. (6 Hrs)

TEXT BOOK S:

1. Modern Digital Electronics – R.P. Jain, II Edn., TMH.
2. OpAmps & Linear Integrated Circuits – Ramakant A. Gayakwad, II Edn., PHI

REFERENCE BOOKS

1. Digital Principles and Applications – A.P. Malvino, Donald P. Leach IV Edn, TMH
2. Digital Computer Electronics – Malvino II Edn., TMH
3. Microelectronics – Jacob Milliman, TMH
4. Integrated Electronics: Analog and Digital Electronic Circuits and Systems – MIllman and Halkias, TMH.
5. Electronics for Scientist & Engineers – Vishwanathan, Mehta and Rajaraman, PHI.
6. Digital Principles & Applications – Malvino & Leach, PHI
7. Microelectronics – Jacob Millman, Arvin GRabel, II Edn., MGH

IT 3.4 COMPUTER ORGANISATION AND ARCHITECTURE

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)

Total Number of Questions to be answered : 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

(I) Introduction to Computer Organization (1 Hr)

Computer System Organization

Computer components

Functions

Interconnection Structure

(II) **Computer Architecture** (1 Hr)

1) Integer Representation

- Unsigned Numbers
- Signed Numbers
  - ν Signed Magnitude
  - ν 2's Complement
  - ν Biased Representation

2) **Integer Arithmetic** (3 Hrs)

- Negation
- Addition
- Subtraction
- Multiplication
  - ν Unsigned
  - ν Signed (Booth's Algorithm)
- Division
  - ν Unsigned
  - ν Signed

3) **Floating Point Representation** (1 Hrs)

- IEEE 32 bits, 64 bits

4) **Floating Point Arithmetic** (3 Hrs)

- Adition
- Subtraction
- Multiplication
- Division
- Accurate Arithmetic
  - ν Guard bits
  - ν Rounding

(III) **Instruction Set** (2 Hrs)

1) Elements of Machine Instructions
2) Representation of Instructions
3) Types of Instructions
4) Number of Addresses (Instruction Formats)

5) Types of Operands
6) Addressing Modes

MODULE II

I) **Semiconductor Memory** (4 Hrs)

1) Memory Hierarchy
2) Characteristics of Memory System
3) Semiconductor RAM Memories
   - Internal Organization of Memory Chip
   - Static RAM
   - Asynchronous DRAM
   - Synchronous DRAM
   - Connection of Memory to the processor
   - RAM Bus memory
   - ROM
   - PROM
   - EPROM
   - EEPROM
   - Flash Memory
   - Error Correction

II) **Cache Memory** (1 Hr)

1) Basics of Cache
   - Structure
   - Read operation
2) Elements of Cache Design

III) **Associative Memory** (2 Hrs)

1) Working principle
2) Associative memory cell and array

IV) **External Memory** (3 Hrs)

1) Magnetic Disk
   - Floppy
   - Hard Disk
   - Read/Write Mechanism
   - Physical Characteristics
   - Disk performance parameters
2) Magnetic Tape
3) Optical Memory
   - CD
   - CD-R
   - CD-RW
   - DVD-R
   - DVD-ROM
4) RAID

V) **Memory Organization and Interleaving** (1/2 Hr)

VI) **Virtual Memory** (1 ½ Hrs)

1) Logical versus physical address space
2) Working principle
3) Mapping Functions
4) Replacement policy

MODULE III

1) **Input/Output** (4 Hrs)
   - External Devices
   - I/O Modules
   - Programmed I/O
   - Interrupt Driven I/O (Interrupt Controller and PPI)
   - Direct Memory Access (DMA Controller)
   - I/O Channel and Processor
2) **Asynchronous Data Transfer** (2 Hrs)
   - Strobe Control
   - Handshaking
   - Asynchronous Serial Transfer
   - Asynchronous Communication Interface
3) **CPU Structure and Functions** (5 Hrs)
   1) Processor Organization
   2) Register Organization
   3) CPU performance and its factors
   4) Instruction Pipeline
      - Basic Concepts of Pipelining
      - Pipeline Performance
      - Pipeline Hazards
        - ν Structural Hazards
        - ν Data Hazards
        - ν Control Hazards
   5) Dealing with branches
4) Introduction to HyperThreaded Processors and Dual core Processors

MODULE IV

1) **Buses** (2 Hrs)
   - Bus interconnection
     - ν VGA
   - Asynchronous v/s Synchronous Buses
   - PCI Bus

- SCSI
- USB

2) **CISC ,**
RISC (2 Hrs)
- Architecture
- Characteristics
- Pipelining
- Overlapped Register Window Concept
- Compiler based Register Organization
- Examples

3)**Multiprocessors** (3 Hrs)
- Characteristics of multiprocessors
- Types of Parallel Processor
- Interconnection structures
- Interprocessor arbitration
- Cache Coherence
- Multiprogramming v/s Multiprocessing
- Symmetric Multiprocessor

4) **Control Unit** (2 Hrs)
1) Micro Operations
2) Control of the Processor

5) **Hardwired** (1 hr)
1) Hardwired Control
2) Complete Processor

6) **Micro programmed Control Unit** (1 hr)
1) Horizontal v/s Vertical microinstructions
2) Control Memory
3) Micro programmed control unit

4) Micro instruction sequencing and execution

TEXT BOOKS:

1. Computer Organization And Architecture. Edition VI By William Stallings
2. Computer Organisation and ArchitecturE By M. Morris Mano
3. Computer Organization. Edition V By Carl Hamacher, Zvonko Vranesic, Safal Zaky

REFERENCE BOOKS:

1. Computer Organisation And Design. Edition III By David A. Patterson, John L. Hennesy
2. Computer Organization. Edition V By Carl Hamacher, Zvonko Vranesic, Safal Zaky

3. How Computers Work By Ron White, Timothy Edward Downs
4. Computer organization and Design Edition II By P. Pal Chaudhauri

IT 3.5 DATA STRUCTURES USING C

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Overview of C Programming: Control structures, Strings, Functions (2 Hrs)
Storage classes and preprocessors, **Pointers:** Initializing pointers, Pointer arithmetic, Pointers and function arguments, Pointer to function, Pointers and arrays, Pointers and string, Array of pointers, Pointers to pointer, Memory allocation in C (3 Hrs)
Structures: Structures and functions, Array of structures, Nested Structures, Structures and pointers, Copy structure (2 Hrs)
Unions, User define data type (typedef), enumerated data type, bit fields, symbolic constants, use of structures (2 Hrs)
Files: Working with strings, Formatted input and output with strings, Error while reading a file, Stdin, Stdout, Stderr pointers, Functions: rewind, ftell, fflush, fseek, Erasing files.(2 Hrs)

MODULE II

Introduction to Data representation and Data Structures: **Arrays**: Representation of arrays and their applications (2 Hrs)
Stacks: Representation of stacks and its applications, **Recursion** (4 Hrs)
Queues: Representation of queues and its applications, Circular queues, Priority queues. (3 Hrs)
List: Singly linked list, doubly linked list, circular linked list, linked stacks and queues, and its applications. (3 Hrs)

MODULE III

Trees: Basic terminology, binary trees and their representations, traversals of trees, applications of trees, B-tree, AVL. (5 Hrs)

Graphs: Basic terminology, representation of graphs, directed and undirected graphs and their traversals, depth first and breadth first search, spanning trees. Applications of graphs**:** shortest path problem, topological sorting, matching. (6 Hrs)

MODULE IV

Sorting: Basic concept, Exchange sort, Insertion sort, Selection sort, Exchange sort, Merge sort, Radix sort, Heaps and Heap sort. (6 Hrs)

Searching: Basic searching techniques, sequential and binary search, tree searching. **Hashing:** Hash function, collision handling mechanisms. (5 Hrs)

TEXT BOOKS:

1. Data Structures and Algorithms by Alfred V. Aho, John E. Hopcroft & J. D. Ullman, Addison Wesley
2. Data Structures using C & C++ by Yedidyah Langson, Moshej Augenstein, Aaron M. Tenenbaum, Prentice Hall of India
3. Data Structures and Program Design in C by Robert L. Kruse, PHI
4. Fundmentals of Computers and Programming in C, a practical approach by G. S. Baluja and G. K. Baluja publisher: Dhanapat Rai & Co.

REFERENCE BOOKS:

1. Fundamentals of Data Structures by Ellis Horowitz and Sartaj Sahni, Galgotia Publications
2. An introduction to data structures with applications by Jean Paul Tremblay and Paul G. Sorenson – Tata McGrawHill
3. Fundamentals of Computer Algorithms by Ellis Horowitz and Sartaj Sahni – Galgotia Publications

IT 3.6 SYSTEM ANALYSIS AND DESIGN

Lecture Per week : (3+ 1+ 2)
Max Marks for Theory paper : 100

Max Marks for Practical : 50
Max marks for sessionals : 20 + 5
Duration of Paper : 3 hours
Total Number of Modules : 4
Number of Questions from Each Module : 2 (Each question shall carry 20marks)
Total Number of Questions to be answered : 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Systems Concepts and the Information Systems Environment (3 Hrs)
Introduction. The Systems Concept: Definition. Characteristics of a System: Organization. Interaction. Interdependence. Integration. Central Objective. Elements of a Systems : Outputs and Inputs. Processor(s). Controls. Feedback. Environment. Boundaries and Interface. Types of Systems: Physical or Abstract Systems. Open or Closed Systems. Man-Made Information. Systems. Illustration-A Dynamic Personnel Information System Model

The System Development Life Cycle (4 Hrs)
Introduction. The Systems Development Life Cycle: Recognition of Need-What Is the Problem? Feasibility Study. Analysis. Design. Implementation. Post-Implementation and Maintenance. Considerations for Candidate Systems: Political Considerations. Planning and Control for System Success. Prototyping.

The Role of the Systems Analyst (4 Hrs)
Introduction. Definition. Historical Perspective: The Early Years. The War Effort. What Does It Take to Do Systems Analysis? Academic and Personal Qualifications. The Multifaceted Role of the Analyst: Change Agent. Investigator and Monitor. Architect. Psychologist. Salesperson. Motivator. Politician. The Analyst/User Interface: Behavioral Issues. Conflict Resolution. The Place of the Analyst in the MIS Organization: The MIS Organization. Rising Positions in System Development: The Paraprofessional. The Technical Writer. Conclusions.

MODULE II

Systems Planning and the Initials Investigation (3 Hrs)
Introduction. Bases for Planning in Systems Analysis: Dimensions of Planning. Initial Investigation: Needs Identification. Determining the Users Information Requirements. Case Scenario. Problem Definition and Project Initiation. Background Analysis. Fact Analysis. Determination of Feasibility.

Information Gathering (2 Hrs)
Introduction. What Kinds OF Information Do We Need? Information about User Staff. Information about Work Flow. Where does Information Originate? Information-Gathering. Tools: Review of Literature, Procedure, & Forms. On-Site Observation. Interviews & Questionnaires. Types of Interview and Questionnaires

The Tools Of Structured Analysis (2 Hrs)
Introduction. What is Structured Analysis? The Tools of Structured Analysis: The Data Flow Diagram(DFD). Data Dictionary. Decision Tree and Structured English. Decision Tables. Pros and Cons of each Tool.

Feasibility Study (2 Hrs)

Introduction. Systems Performance Definition: Statement of Constraints. Identification of Specific System Objectives. Description of Outputs. Feasibility Considerations. Steps in Feasibility Analysis. Feasibility Report. Oral Presentation.

Cost/BenefitAnalysis (2 Hrs)

Introduction. Data Analysis. Cost/Benefit Analysis: Cost and Benefit Categories. Procedure Cost/Benefit Determination. The System Proposal.

MODULE III

The Process and Stages of Systems Design (4 Hrs)

Introduction. The Process of Design: Logical and Physical Design. Design Methodologies: Structured Design. Form-Driven Methodology-the IPO Charts. Structured Walkthrough. Major Development Activities: Personnel Allocation. Audit Considerations: Processing Controls and Data Validations. Audit Trial and Documentation Control

Input/output and Form Design (3 Hrs)

Introduction. Input Design: Input Data. Input Media and Devices. Output Design. Forms Design: What Is a Form? Classification of Forms. Requirements of Forms Design. Carbon Paper as a Form Copier.

Types of Forms. Layout Considerations. Forms Control.

Data BaseDesign (4 Hrs)

Data Base Design: Objectives of Data Base. Key Terms. Logical and Physical Views of Data. Data Structure. Normalization. The Role of the Data Base Administrator.

MODULE IV

System Testing and Quality Assurance (3 Hrs)

Introduction. Why System Testing? What do we test for? The Nature of Test Data. The Test Plan: Activity Network for System Testing. System Testing. Quality Assurance Goals in the Systems Life Cycle. Levels of Quality Assurance. Trends in Testing. Role of the Data Processing Auditor: The Audit Trail.

Implementation and Software Maintenance (3 Hrs)

Introduction. Conversion: Activity Network for Conversion. Combating Resistance to Change. Post- Implementation Review: Request for Review. A Review Plan. Software Maintenance: Maintenance or Enhancement? Primary Activities of a Maintenance Procedure. Reducing Maintenance Costs.

Hardware/Software Selection and the Computer Contract (3 Hrs)

Introduction. The Computer Industry: Hardware Suppliers. Software Suppliers. Service Suppliers. The Software Industry: Types of Software. A Procedure of for Hardware/Software Selection: Major Phase in Selection. Software Selection. The Evaluation Process. Financial Considerations in Selection: The Rental Option. The Lease Option. The Purchase Option. The Used Computer. The Computer Contract: The Art Of Negotiation. Contract Checklist.

Project Scheduling and Software (1 Hr)

Introduction. Why Do Systems Fail? What Is Project management?

Security, Disaster/Recovery, and Ethics in System Development (2 Hrs)
Introduction. System Security. Definitions. Threats to Systems Security. Control Measures. Disaster/Recovery Planning: The Plan. Ethics in System Development: Ethics Codes and Standards of Behavior.

Suggestion for Practical:*Students are expected to take up at least two Case Studies in SYSTEM ANALYSIS AND DESIGN subject. Implementation is to be with application tools, database tools and test tools. A report needed to be developed and presented during practical exams.*

TEXT BOOKS:

1. System analysis and Design by Bliss M Awad II Edition, Galgotia Publications
2. System Analysis and Design Methods, Jeffery White& Lonmic D Benther, IV Edition, Galgotia Pub

REFERENCE BOOKS:

1. Introducing System Analysis and Design Vol I and Vol II International Edition NCC
2. Analysis and Design of Information System, V. Rajaraman, PHI
3. Introduction to SAD, Iger T Haconyszicwych, PHI
4. Analysis and Design of Information System, J.A. Sema, THM

IT 4.1 DISCRETE MATHEMATICAL STRUCTURES

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULEI

Relations, Functions, Equivalence relations, Partially ordered sets, Mathematical Induction (5 Hrs)
Recurrence relations, Counting, Permutations, Combinations, Pigeonhole Principle, Principle of Inclusion and Exclusion. (6 Hrs)

MODULEII

Propositional Calculus, Boolean Algebra (5 Hrs)
Algebraic Structures: Monoids, groups, subgroups, cyclic groups, Abelian groups, Homomorphism and isomorphism of groups. (6 Hrs)

MODULE III

Rings, Integral domain, Fields (3 Hrs)

Vectorspaces: Definition, properties, subspaces, Linear combination, Linear span, Linear independence & dependence of vectors, Basis, Finite dimensional vectorspaces. Linear Transformation (8 Hrs)

MODULE IV

Graph Theory: Introduction to graphs, representing graphs and graph isomorphism, connectivity, Euler's and Hamiltonian paths, shortest path problems, planar graphs, graph colouring. (6 Hrs)

Introduction to Languages and finite state machines: Regular expressions, Regular Languages, Finite state automata, Grammars and finite state machines. (6 Hrs)

TEXT BOOKS:

1. A textbook of Discrete Mathematics by Swapan Kumar Sarkar, S. Chand Publications
2. Discrete Mathematics and its applications by Kenneth Rosen, TMH

REFERENCE BOOKS:

1. Elements of Discrete Mathematics by C. L. Liu, TMH
2. Discrete Mathematical Structures by Dr. D.S.C. Prism Books
3. Discrete Mathematics By Seymour Lipschutz, Schaum outline series, TMH
4. Discrete Mathematical structures with applications to Computer Science, Trembley and Manohar, TMH
5. Graph theory with application to Engineering and Computer Science by Narsingh Deo, PHI

IT 4.2 SIGNALS AND SYSTEMS

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Modeling Concepts and Analysis in Time Domain

Introduction, Examples of Systems, Signal Models, Energy and Power Signals, Energy and Power Spectral Densities, System Modelling Concepts, Superposition Integral with Examples, Properties of Covolution Integral, Impulse Response,Step Response, Frequency Response,Stability.

MODULE II

The Fourier Series and The Fourier Transform and Applications
Trignometric and Complex Exponential Fourier Series, Symmetry Properties of the Coefficients, Parsevals Theorem, Line Spectra, Steady State Response Of Distortionless System, Rate of Convergence of Fourier Spectra. The Fourier Integral, Energy Spectral Density, Fourier Transforms In the Limit, Fourier Transform Theorems, System Analysis with the Fourier Transform, Steady State System Response to Sinusoidal Inputs, Ideal Filters Bandwidth and Rise Time.

MODULE III

The Laplace Transform, Introduction and Examples, Theorems, Inversion of Rational Functions, inversion Integral and its use in obtaining inverse Laplace Transform, Double sided Laplace Transform.
Discrete Time signals and systems, Analog to Digital Conversion:Sampling Theorem, Data Reconstruction and Filtering.
The Z transform, properties, Inverse Z transform and methods
Difference Equations and Discrete Time Systems.

MODULE IV

Analysis and Design of Digital Filters, Structures of Digital Processors, Discrete Time Integration, IIR and FIR filter design. The DFT and FFT Algorithms, Comparison of DFT, Computation of DFT, properties Examples, Mathematical Derivation of FFT, Decimation in Time and Frequency, Applications of FFT.

TEXT BOOKS:

1. Signals and Systems by Zeimer, Tranter, Fannin, IE – Prentice Hall of India.
2. Signals and Systems by Oppenheim and Willskay with Hamid Nawab, Prentice Hall of India

REFERENCE BOOKS:

1. Introduction to Signals and Systems by Linder, McGraw Hill.
2. Signals and Systems by Nagrath, Sharan, Rajan and Kumar, McGraw Hill.
3. Signals and Systems by Simon Haykin & Barry Van Veen, John Weily and sons.

IT 4.3 COMPUTER HARDWARE AND TROULESHOOTING

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

PC Components and features.
Microprocessor types and specifications.
Processor family (8086 onwards……..P3, P4, AMD, Dual core)
Motherboard Components.
Introduction to 8259, 8257 and 8275 circuits.
8279 – Keyboard / Display controller: Block diagram, working principle and interface to a PC system.
Organization of a keyboard, types of keyboards and key switches, interfacing of a keyboard.

MODULE II

Secondary storage devices: Hard disk drives: Construction, working principle, installation procedure for single and multiple drives, partitioning and interfacing to a PC system.
Floppy disk drive: Construction, working principle, drive assembly, recording techniques and interfacing to a PC system.
8272 – Floppy disk controller: Block diagram, working principle and interface to drive and PCsystem.
CDROM Drive: Construction, working principle and interface to a PC system.
DVD : working principle and interface to a PC system

MODULE III

I/O interfaces: IDE and SCSI
Buses: Types of buses
Printers: Types of printers, working principle, troubleshooting
Plotters: Types of Plotters.
Power Supply Units: SMPS, UPS, construction, working principle, power line problems and counter measures.

MODULE IV

Troubleshooting and fault finding: Types and nature of faults, fault diagnosis and trouble shooting for each subsystem in a PC, POST.
Diagnostic tools: Logic probe, logic pulser, logic analyzer, IC tester, digital oscilloscope
Diagnostic software: Types, preventive maintenance for a PC system.

TEXT BOOKS:

1. Troubleshooting, Maintenance and Repairing PCs - By Stephen Bigelow, TMH
2. Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing – By Ray and Bharchandani, TMH
3. IBM PC and Clones – Hardware, Troubleshooting and Maintenance – By Govindarajalu, TMH

REFERENCE BOOKS:

1. Microprocessors and Interfacing – By D.V. Hall, TMH
2. The Complete PC Upgrade and Maintenance Guide – By Mark Minasi, BPB Publications
3. Upgrading and Repairing PCs – By Scout Muller, PHI

IT 4.4 MICROPROCESSOR AND INTERFACING

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Microprocessor 8086:
Detail study of 8086 architecture, addressing modes, instruction formats, data transfer instructions, string instructions, logical instructions, arithmetic instructions, processor control instructions, comparison of 8086 with 8088, assembly language programming, assembly process, assembler directives, procedures-far procedures, near procedures, parameter passing techniques, macros, macro advantages.

MODULE II

8086 CPU Module:
Basic 8086 CPU design, generating system clock and reset signals, microcomputer bus type and buffering techniques. System Bus Structure: Basic 8086 configurations, maximum and minimum mode, system bus timing, interrupts and interrupt responses
8087 Coprocessor: Architecture, connection and cooperation with main processor, Instruction Set of 8087, Programming with the Arithmetic Coprocessor. Use of floating point ADD/SUB/MUL/DIV instructions, Use of F.P. instruction for generating Sine/Cosine/Exp/Log functions.

MODULE III

Interfacing: Programmable Peripheral Interface (PPI): Basic Description of 8255, Architecture, Modes of operation, programming the 8255. Programmable timer 8253/8254
Interrupt Controller: Features of 8259, block diagram of 8259, Interrupt sequence, priority modes and other features Programming the 8259 and interfacing.
Brief introduction to DMA controller and keyboard, Video controller. System Design of 8086 using Memory chips and simple I/O devices using interfaces.

MODULE IV

80386 Architecture : Architecture and signal descriptors, Register organization, Addressing modes, Extended instruction set

Real mode operation of 80836: Real mode operation, Memory addressing and interrupt processing.
Protected mode operation of 80386: Protected mode operation, memory organization – segmentation, descriptor types, and paging, interrupt processing in protected mode. 80386 Memory Management Unit: MMU, virtual memory, descriptor tables GDT, LDT, IDT. Review processors from 80486 onwards.

TEXT BOOKS:

1. The 8086/8088 family design, programming and interfacing – John F.Uffenbeck (PHI)
2. MICROPROCESSORS AND INTERFACING: Programming and Hardware, - By Douglas V. Hall, TMH

REFERENCE BOOKS

1. Microprocessor Systems: The 8086/8088 family architecture programming and design – By Liu and Gibson, PHI
2. Microprocessor Architecture, Programming and Applications - By Gaonkar, PHI

Term work

It shall consist of minimum 8-10 experiments based on the following topics

1. Assembly language programming for 8086. Study of instruction set, Use of MUL/DIV instructions, Use of string processing instruction, use of XLAT instruction for code conversion.
2. Assembly language programming for 8086/8087 Study of NDP instruction set, Use of floating point ADD/SUB/MUL/DIV instructions, Use of F.P. instruction for generating Sine/Cosine/Exp/Log functions.
3. Use of ROM-BIOS services
4. Use of DOS interrupt services.
5. Programs based on 386 addressing modes.
6. Programs based on bit manipulation instructions using assembly language or C.
7. Programs to find square-root of 16-bit number.
8. Interfacing keyboard, display controller, elevators

IT 4.5 DESIGN AND ANALYSIS OF ALGORITHMS

Lecture Per week : (3+ 1+ 2)
Max Marks for Theory paper : 100
Max marks for sessionals : 20 + 5

Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Algorithm Analysis & Complexity :

Algorithm Definition and Specification.
Performance analysis (Space complexity, Time complexity, Asymptotic Notations)
Recurrences (methods)
Performance measurement.
Performance analysis of recursive algorithms.
Recursion.
Towers of Hanoi problem.
Comparison of recursion and Iteration.
Dynamic Storage Management.
Garbage Collection.

MODULE II

Divide and Conquer strategy :

General method.
Binary search
Finding Maximum and Minimum.
Merge sort technique.
Quick sort technique

Greedy method strategy :

General method
Knapsack problem
Job sequencing with deadlines
Minimum cost Spanning trees(Prims & Kruskals algorithm)
Optimal storage on tapes.
Optimal merge patterns.
Single source Shortest paths

MODULE III

Dynamic Programming :

General method
Multistage graphs
All pairs shortest paths
Single Source Shortest paths
Knapsack problem
Travelling Sales person problem.
Flow Shop Scheduling.

Search & Traversal Techniques :

Techniques for graphs- Breadth first search, Depth first search, D search.
Connected components and spanning trees.
Biconnected components.
Code Optimization.
Text processing algorithms (pattern matching)

MODULE IV

Backtracking :
General method.
Sum of subsets Problem
Graph Coloring.
Hamiltonian Cycles**.**
NP-Hard & NP-Complete Problems :
Basic concepts- non-deterministic algorithms.
NP-Hard and NP-Complete classes.
COOK's theorem.
NP-Hard Scheduling Problems.
NP-Hard Code generation Problems

TEXT BOOKS:

1. Fundamentals of Computer Algorithms – E.Horowitz & S.Sahini, Galgotia publication.
2. Introduction to Algorithms – T.H.Cormen, C.E. Leiserson, R.L.Rivest, PHI

REFERENCE BOOKS:

1. The Design and Analysis of Computer Algorithms – Aho Hopcraft & Ulman, Addison Wesley.
2. Algorithms – Robert Sedjewick, Addison Wesley.
3. Fundamentals of Algorithms – Brassord & Bratley, PHI

IT 4.6 OBJECT ORIENTED PROGRAMMING

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Introduction**:** Principles of object oriented programming, object-oriented paradigm. Overview and Benefits of Object-Oriented Programming: Approaches to Software Design ,Evolution of the Object Model ,Benefits of Object Programming, Modeling using UML:UML overview, Nature and purpose of models, Static view, Use case view, Static machine view, Activity view, Interaction view

MODULE II

Abstract data types (ADT), Encapsulation and information hiding, tokens, expressions, control structures, functions , Classes and Objects, Constructors and destructors. Concepts of polymorphism, Function overloading, operator overloading, Overloading types, & rules, explicit & implicit type conversion operators.

MODULE III

Inheritance, extending classes, multiple inheritance, hybrid inheritance, pointers, virtual functions, and classes, and polymorphism. I/O streams and classes, Manipulators, Classes for file streams, file I/O operations and functions.

MODULE IV

Template functions and classes, implementation, Exception handling: Need, Throwing mechanism, try, catch block, Introduction to the Standard Template Library: Components of STL, Containers, Algorithms, Iterators, Applications.

TEXT BOOKS:

1. Object oriented programming with C++ by E Balaguruswamy, Tata McGraw Hill
2. Mastering C++ by K R Venugopal, Rajkumar, T. Ravishankar – Tata McGraw Hill
3. The UML Reference Manual by J.Rumbaugh et al,

REFERENCE BOOKS:

1. Teach yourself C++ by Herbert Schildt, TMH
2. Programming with C++ by J. R. Hubbard (Schaum's Outlines), McGraw Hill.
3. Programming with C++ by D. Ravichandran, McGraw Hill.