VIDYASAGAR UNIVERSITY

COMPUTER SCIENCE
(Honours & General)

Under Graduate Syllabus
(3 Tier Examination Pattern)
w.e.f. 2014-2015

REVISED

Vidyasagar University
Midnapore 721 102
West Bengal

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VIDYASAGAR UNIVERSITY
3-YEAR DEGREE SYLLABUS IN COMPUTER SCIENCE (Honours)

PART – I

PAPER – I (TH) **100 Marks**

Unit- 1:

GROUP –A: Computer Fundamental	15 Marks
GROUP –B: Programming in C	30 Marks

Unit-2:

GROUP –A: Graph Theory	15 Marks
GROUP –B: Numerical Methods	15 Marks
GROUP-C: Operation Research	15 Marks
Internal Assessment –	10 Marks

PAPER – II (TH) **100 Marks**

Unit- 1:

GROUP –A: Digital Electronics	30 Marks
GROUP –B: Discrete Mathematics	15 Marks

Unit- 2:

GROUP –A: Basic Electronics	25 Marks
GROUP- B: Fundamental of Networking	20 Marks
Internal Assessment –	10 Marks

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PART – II

PAPER – III (TH) **100 Marks**

Unit -1:

GROUP –A: Data Structure and Algorithm	25 Marks
GROUP –B: OOPs Using C++	20 Marks

Unit- 2:

GROUP –A: Operating Systems	30 Marks
GROUP –B: Software Engineering	15 Marks
Internal Assessment-	10 Marks

PAPER – IV (TH) **100 Marks**

Unit- 1:

Computer Architecture	45 Marks

Unit -2:

GROUP –A: Microprocessor and Interfacing	25 Marks
GROUP –B: System Programming (Assembler, Loader,Linker)	20 Marks
Internal Assessment-	10 Marks

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PAPER – V (PR) **100 Marks**

Unit 1:

GROUP –A: C Programming	25 Marks
GROUP –B : Numerical Programming using C	25 Marks

Unit 2:

GROUP –A: Digital Electronics	25 Marks
GROUP –B: Microprocessor and Interfacing	25 Marks

PART – III

PAPER – VI (TH) **100 Marks**

Unit -1:

GROUP –A: Fundamentals of Automata and Compiler Design	25 Marks
GROUP –B: DBMS	20 Marks

Unit -2:

GROUP –A: Introduction to JAVA Programming	25 Marks
GROUP –B: Computer Graphics	20 Marks
Internal Assessment-	10 Marks

PAPER – VII (PR) **100 Marks**

Unit- 1:

GROUP –A: Programming in C++	25 Marks
GROUP -B: Computer Graphics	25 Marks

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Unit- 2: RDBMS (ORACLE) 50 Marks

PAPER – VIII (PR) **100 Marks**

Unit- 1:

JAVA Programming 30 Marks

Unit -2:

GROUP –A: Seminar and Industrial Visit 20 Marks

GROUP –B : Project (Based on PHP/dot NET/Mobile Technology/Web Application/ Hardware Technology etc.) 50 Marks

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PART-I

PAPER-I
Theoretical
F.M.-100
(University Examination: 90 & Internal Assessment : 10)

Unit-1 **(45 Marks)**

GROUP –A: Computer Fundamental **15 Marks**

- Computer Basic: Definition and application of computers, softwares, hardware ,Generation of Computers, Types of Computers, I/O unit, Memory, Organization of Computer, Machine language, Assembly language & High level language, concept of algorithm and flow charts.
- Number system: Decimal, Binary, Octal, Hexadecimal number system, conversion from one number system to another. Signed and unsigned integers, r's and (r-1)'s complement, Binary arithmetic, fixed and floating point number representation, BCD arithmetic.

- **Reference Books:**

1. Fundamentals of computers - Raja Raman. V, PHI.
2. Introduction to Computer Science,- ITL Education Solutions Limited, Pearson education.
3. Computer Fundamentals, Anita Goel,
4. Foundations of Computer Science By Ashok Arora

GROUP –B: Programming in C **30 Marks**

- Introduction, basic structure, character set, keywords, Identifiers, constants, variables, Data type. Execution of some simple C programs.
- Operators and Expressions, evaluation and type conversion. Character reading and writing, formatted input and output. Decision making

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(branching and looping) -Simple and nested IF, If-Else, switch-case, While, Do-While, for.

- Arrays -One and two dimensional. String handling with arrays - reading and writing, concatenation and comparison, string handling functions.
- User-defined functions, Recursion, call by value and call by reference.
- Structures and Union -definition and initialization, arrays of structure, arrays within structure, structure within structure, size of structure.
- Pointer- declaration and initialization, accessing variables through pointer, arithmetic pointer and arrays, strings, functions and Dynamic Memory Allocation.
- File handling –opening, reading, writing and closing text file.

➢ **Reference Books:**

1.C Programming, Stephen Kochan
2. Programming with C, Schaum's Series
3. C Programming , V. Balaguru Swami
4. Let Us C, Yashwant Kanetkar
5. Programming in C: A Practical Approach, Ajay Mittal

Unit -2 **(45 Marks)**

GROUP –A: Graph Theory **15 Marks**

- Definition, finite and infinite graphs and undirected, incidence, degree, isolated vertex, pendant vertex, null graphs. Walks, paths and circuits, connected and disconnected graphs. Euler's graph. Hamiltonian paths and circuits, Tree, Bipartite graph, Shortest Spanning Tree- Kruskal algorithm, Prims algorithm, DFS, BFS.

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- **Reference Books:**

1. *Narsingh Deo . Graph Theory and Applications, PHI*
2. *Kenneth H Rosen. "Discrete Mathematics and Its Applications, Tata McGrahHill Publishing Company,New Delhi.*
3. *Robin J. Wilson, "Introduction to Graph Theory" Pearson Education Asia, New Delhi.*

GROUP –B: Numerical Methods **15 Marks**

- Different types of errors in computation: Sources of Errors, Significant figures-Absolute, Relative and Percentage errors.
- Finite differences: Forward and Backward differences.
- Interpolation: Newton's Forward interpolation, Newton's Backward interpolation and Lagrange interpolation.
- Numerical Integration: Derivation of general formula for numerical integration using Newton's forward difference formula, Trapezoidal rule Simpson's 1/3 rule and Simpson's 3/8 rule.
- Solution of Algebraic and Transcendental Equation: Bisection method, Iteration method, Newton-Raphson Method, Regula-Falsi Method.
- Solution of linear equation of the form AX=b : Gaussion elimination, Gauss seidel method and Jacobi iteration method.
- Numerical solution of ordinary differential equations: Euler, Runge-Kutta.

- **Reference Books:**

1. V. Rajaraman, Computer Oriented Numerical Methods - Prentice Hall Publication.

2. S. S. Sastry, Introductory methods of Numerical Analysis - Prentice Hall Publication.

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3. Dr. B. S. Grewal : Numerical Methods in Engineering and Science.
5. Numerical Mathematical Analysis (By J.B.Scarborough)
6. Numerical Analysis & Algorithms, Pradeep Niyogi, TMH
7. Numerical Mathematical Analysis ,Mathews,PHI
8. C language and Numerical Methods (By C.Xavier)

GROUP -C: Operation Research **15 Marks**

- Formulations and graphical solution of (2 variables) canonical and standard terms of linear programming problem, simplex method, Big-M method, transportation and assignment problem, sequencing problem.

- **Reference Books:**

1. Hamdy A.Taha : Operation Research – An introduction 5th edition, PHI., New Delhi–1996.
2. Ravindran: Operation Research Principle and Practice, Wiley Publication
3. Ackoff, R.L. and Sasieni, M.W: Fundamentals of operation research, John Wiley and, sons, Newyork
4. Charnes A. Cooper W. and Hendersen A : introduction to linear programming, John Wiley Andsons, Newyork 1953.
5. Srinath l.s.: PERT and CPM Principles and applications, affiliated east press pvt. Ltd., newyork1973.
7. S.Kalavathy: Operations Research – Second Edition – Vikas Publishing House Pvt. Ltd., 2002.

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PAPER-II
Theoretical
F.M.-100
(University Examination: 90 & Internal Assessment : 10)

Unit-1: **(45 Marks)**
GROUP –A: Digital Electronics **30 Marks**

- Basic Concept- Boolean Algebra.
- Alphanumeric codes: ASCII, EBCDIC, gray code, BCD code, Excess-3, Extended ASCII code.
- Digital System Design : Logic gates, Universal Gates, fundamentalgates, De-Morgan's law, POS, SOP, Minimizationtechnique: K-map,De-Morgan theorem.
- Logic circuit design: encoders, decoders, parity checker,codeconverters, comparators, adder, subtractor, multiplexers, de-multiplexers, parity generators.
- Basic Sequential Circuits: Flip Flops - RS, D, JK, T, master-slave. Multivibrators : Astable and monostable(using IC 555), Registers and Shift registers, counters: synchronous and asynchronous.
- Memory Devices: RAM, ROM, PROM, EPROM, EEPROM.
- Digital-Analog converters: D/A converters -basic, ladder, A/Dconverters-counter, successive approximation.

- **Reference Books:**

1. Fundamentals of Digital Circuits, Anand Kumar, PHI
2. Digital Electronics, Tokheim, TMH
3. Digital Electronics, S. Rangnekar, ISTE/EXCEL
4. Digital Logic & Computer Design, M. Morris Mano
5. Introduction to Digital Computer Design, An, 5th ed., Rajaraman &Radhakrishnan
6. Digital Electronics, P. Raja, Scitech Pub.

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GROUP-B: Discrete Mathematics **15 Marks**

- ❖ Set Theory : Introduction, Definition & Concepts, Representation of Sets, Finite Sets, Infinite Sets (Definition), Set Operations--- Union, Intersection, Addition, Difference, Symmetric Difference, De Morgan's Law, Subsets, Cartesian product, relations & functions, injective, surjective and bijective functions, Equivalence relation.
- ❖ Algebra of logic: Propositions and logic operations, truth tables and propositions generated by set, equivalence and implication laws of logic, mathematical induction.
- ❖ Recursion and recurrence: The many faces of recursion, recurrence, relations and some common recurrence relations, generating functions.

- ➢ **Reference Books:**
  1. *Discrete mathematics and graph theory: Satyanarayana and Prasad.*
  2. *Discrete mathematics with graph theory -3rd Ed.: Goodaire and parmenter.*
  3. *Discrete mathematics and graph theory, 2nd Ed.: Biswal*
  4. *Discrete mathematics : Rajendra Akerkar and Rupali Akerkar.*
  5. *Discrete mathematics: Babu Ram*
  6. *BCA Mathematics : J. Sengupta, S. Roy, S.Chand Pub.*

Unit-2: **(45 Marks)**

GROUP –A: Basic Electronics **25- Marks**

- ❖ Electron Tubes: The Vacuum Diode ,Diode Characteristics ,The Vacuum Triode, Triode Characteristics. Elementary physics of semiconductors : P.N junction diodes, Zener diodes, BJT, FET, MOSFET. Switching characteristics of diodes and transistors,

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Applications of diodes in rectification. Amplifiers concept of negative and positive feedback. Oscillators, R-C, Regulated Power Supply: Inverters: Operational amplifier

Group B: Fundamental of Networking **20 Marks**

- Introduction to Data Communication and network, Overview of ISO-OSI model & TCP/IP Model.
- Physical layer: Network Topology, types of network, network protocols, Transmission Mode. Multiplexing: FDM, WDM & TDM. Transmission media: Guided media, Unguided media. Circuit & Packet Switching.
- Data Link Layer: Error Detection - Type of Error, Detection, Error Correction, framing, Flow and error control, CRC, Hamming Code.
- Network Layer: IP Addressing, IPV4, routing, Gateway.
- Application Layer: DNS, SMTP, FTP, HTTP, WWW.

- **Reference Books:**

1. Data Communication & Networking – Behuouz A. Forouzan, TMH
2. Computer Network – A.S Tanenbaum, Pearson Education
3. Computer Newtworks- kundu – PHI
4. Computer Network – Rajesh – Vikash

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PART-II
PAPER-III

Theoretical **F.M.-100**

(University examination: 90 & Internal Assessment : 10)

Unit-1: **(45 Marks)**

GROUP –A: Data Structure and Algorithm **25 Marks**

- Definition: Concepts of data types. Elementary structures, Data types and their interpretation.
- Complexity: Asymptotic notation, Time and Space complexity, Big-O, Omega, Theta etc., Advantages and Disadvantages. Big O Notation, Big-omega and Big-theta notations, Growth of Functions.
- Finding time complexity of well-known algorithms like- Heap sort, Quick sort, Search algorithm etc.
- Arrays: Types, Memory representation. Address translation. Functions of single and multi dimensional arrays with examples.
- Linked Structures: Definition. Single and doubly linked list (non-circular and circular). List manipulation with pointers: Insertion and deletion of elements. Polymomial addition.
- Stacks and Queues: Definition. Representation. Uses and Applications, Insertion and deletion of elements. Implementation of stack and queue as an array and Linked list. Infix ,postfix and prefix notation. to postfix notation: conversion and evaluation. Application of queues. Deque and priority queue.
- Recursion: Divide and Conquer, Elimination of Recursion, When not to use recursion?
- Binary trees: Definition, extended binary trees, Traversing binary tree ,Binary search tree, Heap , Internal and external path length , Minimum and maximum path length of a binary tree, Huffman's algorithm, Height Balance tree,
- Searching: Linear and binary search, Performance and complexity.

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- ❖ Hashing: Concepts, Advantages and disadvantages. Different types of hash functions, Collision and Collision
- ❖ Sorting: Terminology, Performance Evaluation, Different Sorting Techniques (Bubble, Insertion, Selection, Merge, Quicksort. Heap sort, Radix sort).

➢ **Reference Books:**

1. Data Structure using C – Rajni Jindal – Umesh Publication
2. Data Structure using C – B. Baluja Dhanpatrai Publication
3. Classic Data Structures, 2nd ed., Samanta
4. Data Structures Using C and C++, 2nd ed., Langsam, Augenstein & Tenenbaum

GROUP –B: OOPs Using C++ 20 Marks

- ❖ Introduction to OOPs and C++ Element: Introduction to OOPs, Features & Advantages of OOPs, Difference with procedure oriented programming, Different element of C++ (Tokens, Keywords, Identifiers, Variable, Constant, Operators, Expression, String).
- ❖ Program Control Statements: Sequential Constructs, Decision Making Construct, Iteration / Loop Construct, Arrays, Functions (User defined Function, Inline Function, Function Overloading).
- ❖ Class, Object, Constructor & Destructor: Class, Object, Modifiers (Private, Public & Protected), DataMember, Member Function, Static Data Member, Static Member Function, Friend Function, Constructor (Default Constructor, Parameterized Constructor and Copy Constructor), Destructor.
- ❖ Operator Overloading: Definition, Unary & Binary Operator Overloading.
- ❖ Inheritance & Polymorphism: Inheritance (Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hierarchical Inheritance,

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Hybrid Inheritance), Virtual Base Class, Abstract Class, Introduction to Polymorphism (Runtime Polymorphism, Compile time Polymorphism), Virtual Function.

- ❖ Exception Handling.

- ➢ **Reference Books:**

1. E. Balaguruswami – Object Oriented programming with C++
2. Kris James – Success with C++
3. David Parsons – Object Oriented programming with C++
4. D. Ravichandran – Programming in C++
5. Dewhurst and Stark – Programming in C++
6. Venugopal, Ravishankar, Rajkumar – Mastering C++

Unit-2 **(45 Marks)**
GROUP –A: Operating Systems **30 Marks**

- ❖ Introduction: Operating system functions, evaluation of O.S., Different types of O.S, single user, multi user, GUI, multi-programmed, multi processing, multi tasking, batch, time-sharing, real-time, distributed.
- ❖ Processes: Concept of processes, process state, PCB, co-operating processes, inter- process communication.
- ❖ CPU scheduling: Definition, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, and priority), long-term scheduler, short-term scheduler, medium-term scheduler & multi-level feedback queue.
- ❖ Process Synchronization: background, critical section problem, critical
- ❖ region, classical problems of synchronization, semaphores.
- ❖ Deadlocks: Definition, necessary condition, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, algorithms.

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- Memory Management: background, logical vs. physical address space,swapping, contiguous memory allocation, paging, page replacement algorithms, Belady's anomaly, segmentation, Virtual Memory.
- Threads: overview, benefits ofthreads, user and kernel threads.

- **References Books:**

1.Joshi .Operating System, Wiley Publication.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Doeppner: Operating System in Depth, Wiley Publication.
5. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Operating System, Rajib Chopra, S. Chand Pub.

GROUP –B: Software Engineering **15 Marks**

- Introduction of Software Engineering, Why we study Software Engineering? Difference between Software Engineering & other engineering.
- Basic Concepts of Models: Waterfall Model, Spiral Model, system life cycle.
- System Design: Data Flow Diagrams (DFD), ER diagram, Data Dictionary, Pseudo code, Top-Down And Bottom-Up design, Decision tree, decision table, Functional vs. Object- Oriented approach, quality assurance and verification, validation, maintenance and documentation.
- Testing: Alpha, Beta, Acceptance, Black-Box and White-Box testing.

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- **Reference Books:**

1. Sommerville I: Software Engineering, Addison Wesley
2. Rajib Mall: Software Engineering, PHI
3. Vans Vlet, Software Engineering, SPD
4. Uma, Essentials of Software Engineering, Jaico
5. Sommerville, Ian – Software Engineering, Pearson Education
6. Benmenachen, Software Quality, Vikas
7. IEEE Standards on Software Engineering.
8. Ghezzi C. Jazayeri M and Mandrioli: Fundamentals of software Engg. , PHI
9. Behforooz, Software Engineering Fundamentals,OUP
10. Pankaj Jalote – An Integrated Approach to Software Engineering, NAROSA.
11. Kane, Software Defect Prevention, SPD

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PAPER-IV
TheoreticalF.M.-100
(University Examination: 90 & Internal Assessment : 10)

Unit-1: **(45 Marks)**
Computer Architecture **45 Marks**

- Instruction: Operation Code and Operand. Zero, One, Two and Three address instruction. Instruction types. Addressing modes. Stack organization.
- Memory: Types of Memory. Memory Hierarchy: CPU Register. Cache Memory, Primary Memory, Secondary
- Memory. Virtual Memory (Introduction only). Memory organization - Linear two-dimensional Von Neumann vs
- Harvard Architecture, Different storage technology.
- I/O system organization and interfacing. Bus: SCSI, PCI, USB (introduction and comparative study); Tri State
- Devices, Bus Arbitration.
- Fixed and Floating Point Arithmetic: Addition, Subtraction, Multiplication & Division.
- ALU - Combinational ALU, Two's Complement Addition, Subtraction unit
- Control Unit: Control Structure and Behavior, Hardwired Control and Micro programmed Control: Basic Concept,
- Parallelism in Microinstruction, I/O: Polling, Interrupts, DMA, I/O Bus and Protocol.
- RISC and CISC.

- **Reference Books:**

1. Computer Organization – V. Carl Hamacher & Zvonko G. Vransic – McGraw Hill

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2. Computer Architecture & Logic Design – Thomas C. Barty - McGraw Hill
3. Computer Organization – J.P. Heys
4. Digital Computer – Morris Mano – Pearson.

Unit-2: **(45 Marks)**
GROUP –A: Microprocessor and Interfacing **25 Marks**

- Introduction to microprocessors: Features, Programmers model, external & internal organization.
- 8085 Architecture: 8085 Architecture & organization, Instruction cycles, machine cycles and T-states,address decoding Techniques, minimum system design, 8085 Instruction set: Instruction format, addressing modes,classification of instruction set.,8085 Programming: Assembly language programming:- basic structure,data transfer, arithmetical, logical, transfer of control & Miscellaneous instruction types.
- Stack & subroutines: Stack operations, limitations, subroutine concepts,
- subroutine design, delay subroutine design & applications.
- Interrupts: Requirements, single level interrupt, multilevel interrupt & vector interrupt system, 8085 interrupt structure and its operation, 8259A interrupt controller.
- I/O interfaceing:Features, organization & operating modes of 8255.Basic operationof IC 8155 ,8254,8237.

- **Reference Books:**

1. Microprocessor system Lbu & Glbson Computer Interfacing & applications Venugopal, BPB
2. 8085 microprocessor : programming and interfacing-Srinath N K.

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3. Microprocessor 8085 : architecture, programming and interfacing-Wadhwa Ajay
4. Microprocessor 8085 and its interfacing-Mathur Sunil
5. Microprocessor architecture, programming and applications with 8085/8085A, Wiley eastern Ltd, 1989
by Ramesh S. Gaonkar.
6. Intel Corp: The 8085 / 8085A. Microprocessor Book – Intel marketing communication, Wiley inter
science publications, 1980.
7. An introduction to micro computers Vol. 2 – some real Microprocessor – Galgotia Book Source, New
Delhi by Adam Osborne and J. Kane

GROUP –B: SystemProgramming 20 Marks
(Assembler, Loader, Linker)

- Assembler: 1-pass and 2-pass; different tables; table management; code generation; errors, object model, code module, cross assembler, macro assembler; overviews, algorithms, macro within macro. Simple design,
- Loaders and linkers : Functions, storage allocation, library management. Absolute, BSS, relocating, direct linking. Binders and linkage editors, dynamic loading and linking. Systems utilities; Editor -line, screen, debugger.

➢ **Reference Books:**

1. Systems Programming, Donovan, Tata Mc Graw Hill
2. System Programming, Dhamdhere (IInd Revised Edition), Tata Mc Graw Hill
3. System software, Author: Chattopadhyay Santanu
4. System software : an introduction to systems programming, Author :Beck Leland L

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PAPER – V (PR)
Practical F.M.-1OO

Unit-1 **(50 Marks)**

GROUP –A: C Programming **25 Marks**

1. Program on control statement (IF, Switch, Loops, Arrays, Functions, Structures, etc)
2. Searching: Linear & Binary Search.
3. Sorting: Bubble, Selection, Insertion, Quick & Merge sort, etc.
4. String manipulation.
5. Files (Read & write).

GROUP –B: Numerical Programming using C **25 Marks**

1. Solution of equations by Bisection, Iteration, Regular-falsi, Newton Raphson.
2. Solution of system of equations by Gauss's elimination, Gauss Seidel.
3. Interpolation: Newton forward and Backward and Lagrange interpolations.
4. Integration: Trapezoidal, Simpson's $1/3^{rd}$ & $3/8^{th}$ integration rules.
5. Ordinary Differential Equation: Euler's & Runga Kutta method.

Unit-2: **(50 Marks)**

GROUP –A: Digital Electronics **25 Marks**

Combinational Circuits:

1. Verification of Gates,
2. Half/Full Adder/Subtractor,
3. Parallel Adder/Subtractor,
4. Excess-3 to BCD & Vice Versa,

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5. Binary-Grey & Grey-Binary Converter,
6. MUX/DEMUX,
7. MUX/DEMUX using only NAND Gates,
8. Comparators ,
9. Encoder/Decoder, Design a seven-segment display unit.

Sequential Circuits:

1. Realize S-R, D, J-K, J-K master slave and T flip-flop using basic gates (NAND and NOR).
2. Study the undefined state in S-R flip-flop.
3. Implement a serial adder using Shift Registers, Flip-flops and other logic gates.
4. Design a 4-bit shift register (shift left and shift right) using flip-flops.
5. Design MOD counters using JK master slave flip-flop.
6. Design asynchronous and synchronous counters (3 bit and 4bit) using JK master slave flip-flop.
7. Design decade counter using JK master slave flip-flop.
8. Study the functional characteristics of RAM IC chip. Study ofopen collector and tri-state output. Use 74189, 7489, 2114 or any available chip.

GROUP –B: Microprocessor and Interfacing **25 Marks**

Microprocessor **(15 Marks)**

1. Data movement between register -register, register-memory, memory-memory.
2. Arithmetic operations on single byte, word and multi-byte integer, signed and hexadecimal operands.
3. Multiplication of byte, word by successive addition, shifts and adds method.

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4. Ordered arrangement of set of operands.
5. Bubble sort of a group of byte, Sequential and binary search.
6. Fibonacci sequence.
7. Evolution of simple mathematical expression.
8. Highest and lowest number from a list of byte.
9. Negative and positive number from a list of byte.
10. Block replacement.
11. Code conversion.
12. Parity Generator.
13. Delay Routines.
14. Programming related SID and SOD instruction.

Interfacing using 8255 **(10 Marks)**

1. Use of 8255 indifferent and testing with LEDs, Seven Segment Displays.
2. Display of alphanumeric characters on seven segment displays.
3. Matrix keyboard interfacing and identification of the keys.
4. Generating of square wave through 8255 port.

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PART-III
PAPER-VI
Theoretical F.M.-100
(University examination: 90 & Internal Assessment : 10)
Unit-1: (45 Marks)

GROUP –A:

Fundamentals of Automata &Compiler Design 25 Marks

- AUTOMATA THEORY: Review of finite automata, regular sets, Context free grammars & languages, Moore & Mealy state machines, their capabilities &limitations.Deterministic & Non-Deterministic FSM's, CNF, GNF, Push-down stack &memory machine.
- Basic concepts of programming language, Compiler, Interpreter, Cross Compiler. DFA, NDFA, conversion from NDFA to DFA. Grammars & languages. Structure of a compiler, phases of compilation, such as Lexical analysis, Basic parsing techniques such as shift reduce parsing, operator precedence
- Parsing, Top-down parsing-LL(1), bottom-up parsing-LR, SLR,CLR,LALR. code generation, code optimization, table management, storage management, recursion.

- Symbol tables: Contents, data structures,representation of scope. Syntax directed translation.

- **Reference Books:**

1. Aho, Sethi, Ullman - "Compiler Principles, Techniques and Tools" - Pearson Education.
2. Holub - "Compiler Design in C" - PHI.
3. O.G.Kakde-Comprehensive Compiler Design,Laxmi Publication.

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GROUP –B: DBMS **20 Marks**

- Overview of DBMS: Data, Information, Entity, Attributes, Database, DBMS, Data Independence, DBA, DBA Roles. DDL, DML, DBMS Architecture, Different kind of DBMS Users, Data Dictionary, Types of Database Languages, Advantage & Disadvantage of Database, Database V/S File base.
- Data Models: Hierarchical, Network and Relational Model, Data Definition and Data Manipulation; Constructs in each of the three models, A Comparison of Three Models, Concept of Keys (Super Keys, Candidate Keys, Primary Key, Alternate Key, Foreign Key), Relational Algebra, Different Types of Join (Theta Join, Equi Join, Natural Join, Inner Join and Outer Join), Simple and Complex Queries using Relational Algebra.
- Structured Query Languages (SQL): Create Simple Queries Using (Where, Like, Group By, Having, Order By), View table Structure, Temporary Tables.
- Database Design: ANSI/SPARC 3-Level Architecture, Conceptual Model, Logical Model, Physical Model, Entity, Relational Model, ER Diagram, Strong and Weak Entities, Generalization, Specialization and Aggregation. Loss-Less join decomposition; Interface rules; Functional Dependencies.
- Normalization: Concept, 1NF, 2NF, 3NF, BCNF.
- File organization: Serial, Sequential, indexed sequential, random.

➢ **Reference Books:**

1. The complete reference-By Coach and loney
2. A Beginners guide- By Abbey and corney
3. Database System-Elmasri and Navathe
4. Database system concepts- Silberschatz Abraham Korth Henry F. Jt. auth. Sudarshan S. Jt. Auth.
5. DBMS, Rajib Chopra, S. Chand Pub.

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6. Database management system oracle SQL and PL/SQL- Das Gupta Pranab Kumar

Unit-2: **(45 Marks)**

GROUP –A: Introduction to JAVA Programming **25 Marks**

- Introduction to Java - Features of Java - Object Oriented Concepts - Data Types - Variables - Arrays - Operators - Control Statements- Input and output-Scanner and System class-print(),println(), and printf() methods.
- Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - String Class - Inheritance - Interfaces -Overriding methods - Using super-This- Abstract class – Wrapper class.
- Packages - Access Protection - Importing Packages - Exception Handling - Throw and Throws - Thread - Synchronization - Runnable Interface - Inter thread Communication – Multithreading - I/O Streams - File Streams - Applets – Introduction to Java API Packages(java.lang and java.util)

GROUP –B: Computer Graphics **20 Marks**

- Introduction to Computer Graphics and Graphics Systems: Overview of Computer Graphics, RGB color model, Plotters, Printers, Digitizers, Light pens, etc.; Active and Passive graphics devices; Computer Graphics Software.
- Scan Conversion: Points and Lines, Line Drawing Algorihms; DDA Algorithm, Bresenham's Line Algorithm, Circle Generation Algorithm; Ellipse Generating Algorithm; Scan Line Polygon, Fill Algorithm, Boundary Fill Algorithm, Flood Fill Algorithm.

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- 2D Transformation and Viewing: Basic Transformations--- Translation, Rotation, Scaling; Matrix Representations and homogeneous coordinates, Transformations between coordinate systems; Reflection, Shear; Transformations of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to viewport coordinate transformation; Clipping Operations--- Point clipping, Line clipping, Clipping circles, polygons and ellipse.

- **Reference Books:**

1. Procedural & Mathematical Elements in Computer Graphics, Rogers, TMH

2. Computer Graphics, Hearn & Baker, PHI

3. Introduction to Computer Graphics, A. Mukherjee, VIKAS

4. Fundamentals of Computer Graphics & Multimedia, Mukherjee, PHI

5. Computer Graphics, Bhandari & Joshi, EPH

6. Introduction to Java – Balaguruswami

7. Thinking in Java – Bruce Eckel

8. Java Cookbook – Ian Darwin, O'Reily Pub.

9. Foundation of Java for ABAP Programmes – Alistair Rooney, Apress.

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PAPER – VII (PR)

Practical **F.M.-1OO**
Unit-1 **(50 Marks)**

GROUP –A: Programming in C++ **25 Marks**

- Simple C++ program based on control statement (IF, Switch, LOOP), Arrays, Functions(User defined Function, Inline Function, Function Overloading) using class and objects, Static Data Member, Static Member Function, Friend Function, constructors and destructors; operator overloading. Inheritance (Single, Multiple, Multilevel & Hybrid Inheritance), Virtual Base Class, Polymorphism, Virtual Function, Exception Handling.

GROUP-B: Graphics **25 Marks**

- 2-D Geometry -Use of library graphics function in C or C++, Area fill attributes -fill styles, pattern fill, fill colors, Text attributes : size, front style, front colors, front direction in C or C++.
- Line draw algorithm: DDA Algorithm, Bresenham's line draws Algorithm, Parallel line algorithm, Midpoint circle algorithm midpoint ellipse algorithm. Transformation.

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Unit-2: **(50 Marks)**

GROUP –A: RDBMS (ORACLE) **50 Marks**

- Creating Database: Creating a Database, Creating a Table, Specifying Relational Data Types.
- Table and Record Handling: INSERT statement, Using SELECT and INSERT together, DELETE, UPDATE, TRUNCATE statements, DROP, ALTER statements.
- Retrieving Data from a Database: The SELECT statement, Using the WHERE clause, Using Logical Operators in the WHERE clause Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING Clause Using Aggregate Functions, Combining Tables Using JOINS, Sub-queries.

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PAPER – VIII (PR)
Practical F.M.-1OO

Unit-1: **(30 Marks)**

JAVA Programming **30 Marks**

1. Simple Java program base on control statement (IF, Switch, LOOP)
2. Assignments on class, constructor, overloading, inheritance, Interface, overriding etc.
3. Assignment on array.
4. Assignment on creating and accessing package.

Unit-2 **(70 Marks)**

GROUP –A : Seminar &Industrial Visit **20 Marks**

An Industrial Visit would be organized and students would give a seminar on current Technology.

GROUP –B: Project (Based on PHP/dot NET/Mobile Technology/Web Application/Sensor based micro-controller or 8085-86 Microprocessor etc.) **50 Marks**

- Project Based on PHP/dot NET/Mobile Technology/Web Application/ Sensor based micro-controller or 8085-86 Microprocessor etc. and guided by faculty member of the respective college. For External project at least one internal guide is require for each project. One faculty member cannot guide more than three (3) projects. Individual project is preferred. In case of group project not more than three students participate.

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3 Year Degree Course Syllabus

Computer Science
(General)

PART – I

PAPER-I (TH)	**100 Marks**
GROUP - A: Computer Fundamental	20 Marks
GROUP - B: Digital Electronics	20 Marks
GROUP - C: Programming in C	25 Marks
GROUP - D: Data Structure	25 Marks
Internal Assessment –	10 Marks

PART – II

PAPER –II	**100 Marks**
GROUP – A (TH)	
Unit-I: Basic concepts of Operating Systems	20 Marks
Unit- II: Data Base Management Systems	25 Marks
Internal Assessment –	05 Marks
GROUP – B (PR)	
Data Base Management Systems (ORACLE)	40 Marks
Practical Note Book & VIVA	10 Marks

PAPER -III (PR)	**100 Marks**
GROUP – A: Digital Electronics	25 Marks
GROUP – B: Programming in C and Data Structure	35 Marks
GROUP – C: MS-Word , Excel and PowerPoint	20 Marks
Practical Note Book & VIVA	20 Marks

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PART – III

PAPER –IV	**100 Marks**
GROUP –A (TH)	
Unit-I: Computer Networks	25 Marks
Unit-II : OOPs using C++	20 Marks
Internal Assessment –	05 Marks
GROUP – B (PR)	**50 Marks**
Programming in C++	25 Marks
Practical Note Book & VIVA	05 Marks
Seminar /Project	20 Marks

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COMPUTER SCIENCE (General)
PART-I
PAPER -I

Theoretical **F.M. -100**

(University examination: 90 & Internal Assessment in College: 10)

Group-A: Computer Fundamental **20 Marks**

Brief introduction of computers generations, Types of computer, Computer system -CPU (ALU and control unit), I/O units, Primary and secondary storage, Machine language, Assembly language and High level language, Types of software, Concept of algorithm and flowchart.

- **Reference Books:**
  1. Fundamentals of Digital Circuits, Anand Kumar, PHI
  2. Raja Raman. V: Fundamentals of computers, PHI

Group -B: Digital Electronics **20 Marks**

Number system: Decimal, Binary, Octal, Hexadecimal number systems, conversion from one number system to another. Signed and unsigned integers, r's and (r-1)'s complement, Binary arithmetic, fixed and floating point number representation, BCD arithmetic.

Bit, Byte, Nibble, Word, Basic structure of Computer-I/O unit, Arithmetic Logical Unit, Memory Unit, Control Unit, Peripheral devices -different of I/O Units, Dot-matrix printer, Laser printer, Floppy disk, magnetic tape, Magnetic disk, Memory devices ROM, RAM, Serial Access and Direct Access memories.

Boolean Algebra: Postulates and Theorems, OR, AND, NOT operators, Truth tables, Boolean identities, De Morgan's theorems. Logic gates -AND, OR, NOT, NAND, NOR Exclusive-OR Boolean functions, Half-Adder, Full Adder, Memory Circuits -Flip-Flop.

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- **Reference Books:**
  1. Fundamentals of Digital Circuits, Anand Kumar, PHI
  2. Digital Electronics, Tokheim, TMH
  3. Digital Electronics, S. Rangnekar, ISTE/EXCEL
  4. Digital Logic & Computer Design, M. Morris Mano
  5. Introduction to Digital Computer Design, An, 5th ed., Rajaraman & Radhakrishnan
  6. Digital Electronics – P. Raja

Group -C: Programming in C **25 Marks**

C - Language: Basics, Types of operations and expressions, Variable names, Data type, Arithmetic, relational and logical operators. Type conversion. Bit wise logical operators and conditional expressions.

Control Flow: Statements and blocks, If-else, else-if, switch statement, while, for and do-while loop, break, continue and goto statements. Functions: Functions, arguments, auto, external, static and register variables, recursion.
Arrays: Basic Concepts, Memory Representation, One Dimensional Arrays, Two Dimensional Arrays

Pointers: Basic Concepts, &, * Operator, Pointer expression: assignment, arithmetic, comparison, Dynamic Memory Allocation.

- **Reference Books:**
  1. C Programming, Stephen Kochan
  2. Programming with C, Schaum's Series
  3. C Programming , V. Balaguru Swami

Group -D: Data Structure **25 Marks**

Introduction to algorithm, analysis for time and space requirements. Linear data structures: Array, stack, queue, circular queue, deque and their operations

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and applications.Trees: Definition, Binary Trees, Strictly Binary Trees, Complete and Full Binary Trees, Tree Traversing (Inorder, Preorder and Postorder).Searching: Linear and Binary search.Sorting: Bubble, Insertion & Selection sort.

- **Reference Books:**
  1. Data Structure using C – Rajni Jindal – Umesh Publication
  2. Data Structure using C – B. Baluja Dhanpatrai Publication
  3. Classic Data Structures, 2nd ed., Samanta

Internal Assessment **10 Marks**

PART-II
PAPER -II

Theoretical **F.M.-50**

(University Examination: 45 & Internal Assessment in College: 05)

GROUP – A (TH)

Unit-I: Basic concepts of Operating Systems **20 Marks**

Introduction: What is OS, Operating system functions, Different types of O.S.: single user, multi user, GUI, multi-programmed, multi processing, multi tasking, batch, time-sharing, real-time.

Processes: Concept of processes, process state, PCB.

CPU scheduling: Definition, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, & RR), long-term scheduler, short-term scheduler & medium-term scheduler.

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Memory Management: Contiguous memory allocation, paging, page replacement algorithms, swapping.

- **References Books:**

  1. Milenkovie M., "Operating System : Concept & Design", McGraw Hill.

  2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.

  3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.

  4. Dhamdhere: Operating System TMH

Unit-II: Data Base Management Systems **25 Marks**

Basic concepts: Entity, Attributes, Data Base, DBMS, different types of keys. Relational Algebra: Union, Intersection, Subtraction, Cartesian Product, Division, Natural Join, Selection and Projection.

Database Design: ANSI/SPARC 3-Level Architecture, Conceptual Model, Logical Model, Physical Model, ER Diagram, Strong and Weak Entities.

Structured Query Languages: Create Simple Queries Using Single Table.

Functional dependencies: first, second and third normal forms.

- **Reference Books:**

  1. The complete reference-By Coach and loney

  2. A Beginners guide- By Abbey and corney

  3. Database System-Elmasri and Navathe

Internal Assessment **05 Marks**

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Practical
F.M.-5O
GROUP – B (PR)

Data Base Management Systems **40 Marks**
ORACLE

1. Creating a Database: Creating a Table, Data Types.
2. Table and Record Handling: INSERT statement, Using SELECT and INSERT together, DELETE, UPDATE, DROP, ALTER statements.
3. Retrieving Data from a Database: The SELECT statement, Using the WHERE clause, Using Logical Operators in the WHERE clause Using IN, LIKE, ORDER BY.
4. SQL.

Practical Note Book & VIVA **10 Marks**

PAPER-III (PR)

Practical **F.M.-100**
Group -A: Digital Electronics **25 Marks**

1. Familiarization with the following digital IC's NAND and NOR gates.
2. Demonstrate the Universal nature of NAND and NOR gates by relating AND, OR and NOT gates using IC.
3. Set up Exclusive -OR function using NAND & NOR gates.
4. Set up combinational circuits to implement some Boolean functions and test them.
5. Demonstrate the use of Half-Adder using five NAND/NOR gates.
6. Demonstrate the working of Full-Adder with NAND/NOR gates.

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Group -B: Programming in C and Data Structure 35 Marks

1. Program on control statement (IF, Switch, LOOP), Arrays, Functions.
2. Searching: Linear & Binary.
3. Sorting: Bubble, Insertion.
4. String manipulation: No. of vowel's, Consonants & words; abbreviation, string palindrome.
5. Arrays: Insert Delete, Stack, Queue, Transpose of a matrix, Add two matrixes.
6. Recursion: Factorial, Fibonacci series, GCD.
7. Searching: Linear & Binary Search.
8. Sorting: Bubble, Selection, and Insertion.

Group -C: MS Word, EXCEL and Power Point 20 Marks

Concept of general tools of MS word, Excel and Powerpoint. Document prepare and analysis using Ms-Excel, Presentation slide prepared using animation

Practical Note Book & VIVA (10+10) =20 Marks

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PART-III

PAPER-IV **100 Marks**

Theoretical **F.M.-50**

(University Examination: 45 & Internal Assessment in College: 05)

GROUP –A (TH)

Unit – I: Computer Networks 25 Marks

Introduction to Data Communication and network, Overview of ISO-OSI model.

Physical layer: Network Topology, types of network, network protocols, Transmission Mode. Multiplexing: FDM, WDM & TDM. Transmission media: Guided media, Unguided media. Circuit & Packet Switching.

Data Link Layer: Error Detection - Type of Error, Detection, Error Correction, framing, Flow and error control, CRC, Hamming Code.

Network Layer: IP Addressing, IPV4, routing, Gateway.

Application Layer: DNS, SMTP, FTP, HTTP, WWW.

- **Reference Books:**
  1. *Data Communication & Networking – Behuouz A. Forouzan, TMH*
  2. *Computer Network – A.S Tanenbaum, Pearson Education*

Unit – II: OOPS Using C++ 20 Marks

Principles of Object Oriented Programming (OOP) : Evolution of C++ - Programming Paradigms - Key Concepts of OOP - Advantages of OOP - Usage of OOP and C++ .Input and Output in C++-Streams-Stream classes

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Unformatted console I/O operations-Member functions of istream class-manipulators-manipulators with parameters

Introduction to C++: Tokens, Keywords, Identifiers, Variables, Operators, Expressions and Control Structures: If,If..Else, Switch - Repetitive Statements- for, while, do..while, Pointers and arrays
Inline Functions, friend function, function Overloading and Operator Overloading, Classes and Objects, Constructors and Destructors, Type of Constructors

Inheritance: Single Inheritance ,Multilevel inheritance ,Multiple inheritance, Hierarchical Inheritance , Hybrid Inheritance. Pointers - Virtual Functions and Polymorphism

- **Reference Books:**

  1. *E. Balaguruswami – Object Oriented programming with C++*
  2. *Kris James – Success with C++*
  3. *David Parsons – Object Oriented programming with C++*
  4. *D. Ravichandran – Programming in C++*
  5. *Dewhurst and Stark – Programming in C++*
  6. *Venugopal, Ravishankar, Rajkumar – Mastering C++*

Internal Assessment **05 Marks**

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Practical
F.M.-5O Marks

GROUP – B (PR):

Programming in C++	**15 Marks**
Practical Note Book & VIVA	05 Marks

GROUP –C: Project (Based on VB/PHP/dot NET/Mobile Technology/Web Application etc.)

Marks Allotment for Project:

Project & Thesis:	20 Marks
Project presentation & VIVA:	10 Marks

Project guide will be faculty members of respective colleges. For external project at least one internal guide is require for each project. In case of group project not more than three students participate. Individual project is preferred.

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