TAMIL NADU PUBLIC SERVICE EXAMINATIONS
SYLLABUS

Code No.166

SUBJECT: COMPUTER SCIENCE(Degree Standard)

UNIT–I: FUNDAMENTALS OF INFORMATION TECHNOLOGY

Introduction to Computer – Classification of Digital Computer System – Computer Architecture – Memory Units – Auxiliary Storage Devices – Input and Output Devices.Introduction to Computer Software – Operating System – Programming Languages – General Software Features and trends. Compilers – loaders- linkers- assemblers – translators.

UNIT-II: DISCRETE MATHEMATICS

Mathematical Logic: statements and notation – connectives – negation – conjunction – disjunction – statement formulas and truth tables – conditional and bi-conditional – well formed formulas – tautologies – equivalence of formulas – duality law – disjunctive normal form – conjunctive Normal form. Basic concepts of set theory – notation – inclusion and equality – power set – operations – venn Diagrams – identifiers – cartesian products – relations and ordering – functions – composition – inverse- binary and n-ary operations. Lattices as partially ordered sets: Definition – properties – special lattices: complete, complemented, distributive lattices – boolean algebra: properties of boolean algebra.

Unit-III: DATA STRUCTURES & DESIGN OF COMPUTER ALGORITHMS

Arrays: Ordered Lists-Representation of arrays. Stacks and queues: fundamentals-evaluation of expressions-multiple stacks and queues.Linked Lists: Singly Linked Lists-Linked stacks and queues-polynomial addition-Doubly linked lists and dynamic-Garbage collection and compaction. Trees: Basic terminology-Binary trees-Binary tree representation-Binary tree traversal. Complete Development of an algorithm : - Statement – model development – Design of an algorithm – 8-Queen's problem- greedy algorithm – maze problem – nearest neighbour algorithm – traveling salesman problem Divide and Conquer. Design methods of an Algorithm**:** Sub goals-Hill Climbing-Working Backward-Heuristic-Back Tracking.- Recursion

UNIT–IV: DIGITAL COMPUTER ORGANIZATION & MICROPROCESSORS

Number Systems and Logic Circuits: Number systems - Decimal, Binary, Octal, Hexadecimal - conversion from one to another - Characters and codes - ASCII code, Excess-3 code, gray code - binary addition, subtraction, multiplication and division - unsigned binary numbers - signed magnitude numbers - complements in number systems - Truth tables, AND, OR, NOT, NOR & NAND gates, EX-OR gates - parity generators and checkers. Boolean Algebra and Digital Circuits : Boolean laws and theorems - De Morgan's theorems - Duality theorem - simplification of sum of product and product of sum expressions - Karnaugh map and simplifications - Simple arithmetic circuits - Half and Full adders - Binary adder/subtracter - BCD adder

- Data processing circuits - Multiplexers - Demultiplexers -Encoders and Decoders. Microprocessor Architecture: Intel 8085 - Instruction Cycle - Timing diagram - Instruction Format - Addressing modes - Instructions .Instructions : Data transfer - Arithmetic – Logic – Branching - Stacks - Subroutines – MACRO**.** Programming: Simple examples - 8-bit addition and subtraction - 16-bit addition - 8-bit decimal subtraction - complements of 8-bit and 16-bit number - shifting bits - masking bits - finding square - finding largest of two numbers - finding largest and smallest in an array - ordering data array - sum of series of numbers - 8-bit multiplication and division – multibyte addition and subtraction - square root of a number .

UNIT– V: OPERATING SYSTEMS

Computer Science overview-Basic elements-interrupts-cache memory-I/O communication techniques-evolution-developments leading to modern OS. Process description and control-process-process states-process- control-Uniprocessor scheduling-types-scheduling algorithms. Mutual exclusion and synchronization-concurrency-semaphores-monetors-message passing-readers and writers problem. Deadlock and starvation-principles-prevention-avoidance-detection-dining philosopher's problem.
Memory Management-requirements-partitioning-paging-segmentation-virtual memory-hardware and control structures-operating system software.I/O management and disk scheduling-I/O devices-I/O buffering -disk scheduling. File management-organization and access-File directories-file sharing-record blocking-secondary storage management.

UNIT–VI: DATA BASE SYSTEMS

Introduction: Objectives - Early Information Systems - Problems with Early Information Systems - Organization of Data Base - Components of Data Base Management System-Data Models - Entity - Relationship Model - Network Data Model, Hierarchical Data Model - Semantic Data Modelling.File Organization - Sequential file organization - The indexed sequential file organization -Creation and manipulating of indexed sequential file - Hashing - Key-to-address transformation.Relational Data Model : Introduction - Basic definition and terminology - Relational algebra.

UNIT-VII:SOFTWARE ENGINEERING

Sotware Project Planning: Size Estimation-Cost Estimation Models-The Constructive Cost Model(COCOMO)-COCOMO II-The Putnam Resource Allocation Models-Software Risk Managements - Software Design: Definition-Modularity-Strategy of Designs-Function Oriented Design-IEEE Recommended Practice for Software Design Descriptions-Object Oriented Design. Software Metrics: Meaning -Token Count-Data Structure Metrics-Information Flow Metrics-Metrics Analysis - Software Reliability: Basic Concepts-Software Quality-Software Reliability Models-Capability Maturity Models-ISO 9000. Software Testing: Testing Process-Some Technologies-Functional Testing-Structural Testing-Levels of Testing-Debugging-Testing Tools.

UNIT–VIII: COMPUTER NETWORKS

Introduction to Computer Networks and Data Communication: Need for computer networks - evolution - Data Communication - Data Transmission - Transmission media -

Classification of Networks - Switching and Routing - Routing - Multiplexing and Concentration Concentrator - Terminal Handling - Components of a Computer Network. Network Standards and OSI - Need for network standard - OSI reference model - Physical layer - Data link layer - Network layer - Transport layer - Session layer - Application layer.

UNIT-IX:COMPUTER GRAPHICS

Introduction – Point plotting techniques – Line drawing displays – Two dimensional displays – Clipping and Windowing. Graphics package – segmented display files – display file compilation – geometric models – Picture structure. Graphical input units – graphical input techniques – event handling – input functions. Raster graphics fundamentals – solid area scan conversion – interactive raster graphics – Raster graphics systems – raster display hardware. Two dimensional and three dimensional transformations.

UNIT–X: C PROGRAMMING & OBJECT ORIENTED PROGRAMMING CONCEPTS

Data Types - Variables - Operators - Control structures - Looping structures - Arrays - Strings - Built-in-functions. Function - Scope of Variables - Advanced features of functions. Pointer - Pointers to Array - Pointer Array - Pointer Arithmetic - Pointer of Pointer - Functions and Pointers -Structures and Pointers - Dynamic Allocation - Function pointer. Introduction: Advantages of OOP-Characteristics of OO languages: classes - objects-inheritance-reusability - creating new data types - polymorphism and overloading - C++ programming basics - Loops and decisions. Objects and Classes: A simple class - C++ objects as physical objects and data types -constructors - destructors - objects as function arguments - returning objects from functions -structures and classes-class, object and memory - static class data - arrays and strings. Operator overloading: Unary and binary operators - data conversion-inheritance: derived class constructors - overloading member functions - class hierarchies - public and private inheritance - levels of inheritance - multiple inheritance - pointers.

BOOKS FOR REFERENCES:
1. Alexis Leon. Mathews Leon, Fundamentals of Information Technology,Leon TECH World
2. Using Information Technology, Sawyer, Hutchinson and Williams , Irwing – Mcgraw Hill.
3. V. Rajaraman, "Introduction to Computers", PrenticeHall India, 1991
4. J.P.Tremblay, R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science", McGraw-Hill International Edition,1987.
5. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data structure", Galgotia Publications, New Delhi.1985.
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7. Computer System Architecture, M. Morris Mano, Pearson Education, III Edition

8. Ramesh S. Gaonkar , "Microprocessor Architecture, Programming and Applications with the 8085/8080A", Wiley Eastern Ltd, New Delhi, 1989.

9. Ram B., "Fundamentals of Microprocessors and Microcomputers", Dhanpat Rai & Sons,New Delhi, 1995.
   10. Operating Systems,Concepts and Design- E.Madnick and John Donovan, TMH, New Delhi

11. William Stallings, "Operating systems Internal and design principles", 5th edition, Pearson education Inc., Low price edition, 2006.

12. Data Base System Concepts- Abraham Silberschatz & Henry F. Korth, TMH, IV Edition, 2002.

13. Roger S. Pressman, Software Engineering", TMH,2002
    14. Ian Sommerville, "Software Engineering",5th Edition, Addison Wesley, 2002.

15. Richard Fairley, "Software Engineering Concepts", McGraw Hill Publishing Company Ltd.,1988

16. Andrew S Tanenbaum, "Computer Networks", Prentice Hall of India, New Delhi,1999.

17. Donald Hearn & Pauline Baker, "Computer Graphics", PHI, 2002

18. E.Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, New Delhi,2.1 Edition, 2002.

19. Object Oriented Programming with C++ , E.Balagurusamy, Tata Mcgraw Hill, 1985