PG ENTRANCE EXAMINATION SYLLABUS OF JULY 2024

Software Engineering

History and Foundations of Software Engineering - Evolution of Software Engineering - Key figures such as Margaret Hamilton **Testing:** - Types of testing - When different types of testing are performed **Requirements Engineering:** - Techniques such as FAST (Facilitated Application Specification Technique)- Components of a good Software Requirement Specification (SRS) Software Testing - Traditional order of testing activities (unit testing, integration testing, system testing, validation testing)- Concepts like smoke testing. **Architectural Design:** - Architectural styles. **Object-Oriented Concepts:** - Classes, objects, inheritance (super class, subclass), polymorphism. **Software Development Process Models:** - Adaptive Software Development (ASD) framework activities - Understanding different process models. **Quality Management** - Cost of quality - Measures of software quality. **Formal Technical Reviews:** - Objectives and benefits of formal technical reviews. **Six Sigma Methodology** - Core steps (define, measure, analyze, improve, control)

Computer Networks

Fundamentals of Computer Networks: - Basic concepts: data communication, networking principles. - Network types - Network topologies. **Network Protocols:** - TCP/IP suite: protocols, layers, functions. - **OSI model** - SMTP (Simple Mail Transfer Protocol), HTTP, FTP, etc. **IP Addressing:**- IPv4 vs IPv6: addressing schemes, subnetting, CIDR. - Address resolution: ARP (Address Resolution Protocol). **Data Link Layer**. **Transport Layer** - TCP (Transmission Control Protocol): connection-oriented, reliable delivery. - UDP (User Datagram Protocol): connectionless, unreliable delivery. **Network Layer** - IP (Internet Protocol): addressing, routing, packet forwarding. - ICMP (Internet Control Message Protocol): error reporting, diagnostics. **Wireless and Wi-Fi Technologies** - Wireless communication principles: frequency bands, modulation techniques. **Network Security** - Threats and vulnerabilities: viruses, malware, phishing. - Encryption: methods, protocols (e.g., TLS/SSL).**Network Performance** - Bandwidth, latency, throughput. - QoS (Quality of Service): mechanisms, techniques. **Network Management and Administration** - Monitoring tools: SNMP (Simple Network Management Protocol), etc. - Troubleshooting: tools, techniques.

Dr. S. GOPINATHAN, Ph.D.,
Professor and Head
Department of Computer Science
University of Madras
Guindy Campus, Chennai - 600 025

Java programming

Java Basics - Variables and data types - Operators (increment (++), multiplication (*)) - **Keywords and Constructs** - Constructor chaining **Polymorphism** - Types of polymorphism in Java (compile-time and runtime) **Interfaces** - Definition and usage of interfaces in Java - Keyword `interface` **Data Types** - Char data type in Java (numerical range) **Object-Oriented Concepts** - Object lifecycle and ownership (aggregation, composition, encapsulation) **StringBuffer and StringBuilder** - Methods to manipulate strings **String Class** - Method `equals()` and its return type (`boolean`) **Java Beans** - Requirements and characteristics of Java beans **Access Specifiers** - Access levels **Packages** - Importing packages (`import pkg.*`) **JDBC and Isolation Levels** - JDBC connection isolation levels **Bitwise Operators** - Left shift operator (`<<`) and its behavior **Constructor** - Default constructor prototype **Standard Java Packages** - Packages like `java.lang`, `java.util`, etc.

WAD (Web Technology Application Development)

HTML Basics: HTML Tags and Elements - Creating Hyperlinks - Table Elements. **Web Browsers and Rendering:-** Understanding Web Browsers - Web Servers vs. Web Browsers. **Fonts and Typography in Web Pages :-** Web Font Formats. **HTML Forms and CGI** - HTML Forms - Types of Web Pages. **JavaScript Basics:** - Embedding JavaScript in HTML -Defining Functions in JavaScript. **HTML Image Element :- Attributes of <img> Tag - Image Alignment and Spacing . HTML Attributes and Syntax** - Attributes and Proper Syntax: Non-Specified Align Values. **Tables and Attributes:-** Attributes for <tr> Element - Directional Attributes. **Color Coding in HTML:- Color Values . Miscellaneous HTML Concepts:-** Wildcard Symbol - Default Attribute Values

DP (Digital Principles)

Number Systems and Conversions:- Binary, Octal, Decimal, and Hexadecimal Conversions: -BCD (Binary-Coded Decimal) Arithmetic: **Boolean Algebra and Logic Gates-** Boolean Algebra: De-Morgan's Theorems: **Sequential Circuits-** Flip-Flops: - Registers: **Combinational Circuits -** Adders: Multiplexers and Encoders: **Memory and Storage :-** ROM (Read-Only Memory): Functional Blocks of Digital Computer Systems:. **Central Processing Unit (CPU)** Components of CPU: **Miscellaneous Digital Concepts -** Basic Components: - Fundamental Blocks of Digital Systems:

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Data Structures

Deques (Double-Ended Queues): Input-restricted deque (insertions at one end, deletions at both ends).Output-restricted deque. **Priority Queues:** Properties and use cases. **Tree Structures - Binary Trees :** Complete binary tree -Binary search tree -Extended binary tree. **Special Pointers in Binary Trees:** Threaded binary trees. **Heap Trees -Heap Properties:** Max-heap and min-heap properties. **Graph Theory:-Graph Representations and Properties: Graph Traversal Algorithms:**Breadth-First Search (BFS). **Algorithm Complexity:-Complexity Analysis:** Best case, worst case, and average case scenarios -Space complexity and time complexity. **Linked Lists :-Types of Linked Lists. Expression Evaluation:-Prefix (Polish) Notation:**Evaluation of prefix expressions. **Sorting Algorithms:-Quick Sort:**Selection of pivot keys.**Other Sorting Methods:** Insertion sort -Selection sort -Deletion and exchange methods. **Algorithm Design Techniques:-Algorithm Types:**Greedy algorithms-Dynamic programming-Branch and Bound-Backtracking. **Program Testing and Debugging:-Testing Phases:-** Validation and error checking -Debugging and profiling. **Algorithm Representation - Flow Charts - Pseudo-code. Memory Management:- Space Complexity.**

Database Management Systems (DBMS)

Keys and Relationships :-Primary Key -Foreign Key -Secondary Key. **DBMS Fundamentals:-** Data Independence - Centralized Control of Data. **SQL Basics and Querying:-** SQL Query Behavior - SQL Functions - SQL Statements. **Database Languages:-**
DML (Data Manipulation Language) - DDL (Data Definition Language) -DCL (Data Control Language). Database Schema and Integrity:- Database Schema: Entity Integrity -Referential Integrity. **Entity-Relationship (E-R) Model:-**Entities and Attributes-E-R Diagram Symbols. **Relational Model:-**Features of Relational Model - Tables and Relations. **Database Design:-**Normalization -Schemas and Tables. **Views:-** Definition and Use -Properties of Views. **Advanced SQL Concepts:-**Joins –Constraints.

Operating System

Introduction to Operating Systems: Role of Operating System. **Process Management** -Process States -Process Control Block (PCB). **Schedulers** -Short-Term Scheduler-Medium-Term Scheduler -Long-Term Scheduler. **Deadlock-**Conditions for Deadlock. **Memory Management -** Address Spaces -Virtual Memory. **File System Management :-**

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File Operations - File System Structures. **Concurrency and Synchronization:-** Process Synchronization-Critical Section Problem. **I/O Management:-**I/O Devices - I/O Scheduling. **Protection and Security:-** Access Control-Security Threats. **System Calls and APIs-** Interface to OS Services. **CPU Scheduling -** Scheduling Algorithms. **Interrupts and Exceptions -** Types of Interrupts -Exception Handling. **Concurrency Issues:-** Race Conditions - Deadlock Handling. **Operating System Design:-** Microkernel and Monolithic Kernels. **Real-Time Operating Systems (RTOS):-** Characteristics - Applications. **Critical Sections and Mutual Exclusion:-** Synchronization Mechanisms.

C++

Introduction to C++.Data Types and Variables-Operators - Control Flow -Functions - Arrays and Strings -Pointers and References - Object-Oriented Programming (OOP) Basics -Templates and Standard Template Library (STL) - Exception Handling -File Handling -Dynamic Memory Management -Preprocessor Directives and Macros

Python

Introduction to Python-Basic Python Syntax - Control Flow -Data Structures -Functions and Modules -Object-Oriented Programming (OOP) -Exception Handling -File Handling -Iterators and Generators - Data Processing and Manipulation - Database Access - Testing and Debugging.

Reference Books:

1. **"Python Crash Course" by Eric Matthes** - A beginner-friendly book that covers Python basics and introduces key concepts through practical examples and projects.
2. **"Programming: Principles and Practice Using C++" by Bjarne Stroustrup** - Written by the creator of C++, it provides a solid introduction to programming with C++ and covers modern C++ features.
3. **"Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss** - Covers a wide range of data structures and their implementations in C++, along with algorithms for analyzing them.
4. **"Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan** - Provides a comprehensive introduction to database systems,

Dr. S. GOPINATHAN, Ph.D.,
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University of Madras
Guindy Campus, Chennai - 600 025

covering the theoretical foundations as well as practical aspects of database management.

5. **"Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos** - Discusses modern operating system design principles, including multiprocessor systems, distributed systems, and security.
6. **"Web Technology: Theory and Practice" by Srinivas Padmanabhuni** - Covers the foundational concepts of web technologies including HTML, CSS, JavaScript, and server-side technologies.
7. **"Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross** - Provides a comprehensive introduction to computer networking, covering protocols, network architecture, and applications.
8. **"Java: The Complete Reference" by Herbert Schildt** - A comprehensive guide to Java programming language, covering core concepts, syntax, and libraries.
9. **"Digital Logic and Computer Design" by M. Morris Mano** - Provides an introduction to digital logic circuits, covering topics from basic to advanced digital design.
10. **"Software Engineering: A Practitioner's Approach" by Roger S. Pressman** - Covers the entire software engineering process, including requirements analysis, design, development, testing, and maintenance.

Dr. S. GOPINATHAN, Ph.D.,
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Guindy Campus, Chennai - 600 025

NAME :

REGISTER NO :

Signature of the Invigilator :

DEPARTMENT OF COMPUTER SCIENCE, GUINDY CAMPUS,

UNIVERSITY OF MADRAS, CHENNAI-600025.

M.Sc (Computer Science) – Entrance Examination , July-2023.

Time : 1 Hour **MAX MARKS : 50**

DATE: 12-07-2023 **ANSWER ALL THE QUESTIONS** **50 x 1 = 50**

1. If DBA modify the structure of the data record, then this modification does not affect other application is called
   A. Data Isolation
   B. Data Independence
   C. Data Security
   D. Data Integrity

   Ans :

2. The intersection operator is used to get the _____ tuples.
   A. Different
   B. Common
   C. All
   D. Repeating

   Ans :

3. Which of the following is not a class of constraint in SQL Server?
   A. NOT NULL
   B. CHECK
   C. NULL
   D. UNIQUE

   Ans :

4. Which of the following is not Armstrong's Axiom?
   A. Reflexivity rule
   B. Transitivity rule
   C. Pseudo transitivity rule
   D. Augmentation rule

   Ans :

5. In _____ attacks, the attacker manages to get an application to execute an SQL query created by the attacker.
   A. SQL injection
   B. SQL
   C. Direct
   D. Application

Ans :

6. Entity is a _____
   A. Object of relation
   B. Present working model
   C. Thing in real world
   D. Model of relation

Ans :

7. Which of the following attribute is used for merging two or more adjacent columns?
   A. Row span
   B. Cell Spacing
   C. Col span
   D. Cell Padding

Ans :

8. Which of the following is used to transmit information on the World Wide Web?
   A. HPPT
   B. HTTP
   C. HTTPs
   D. HTPP

Ans :

9. A Website is a _____ cookie
   A. Volatile
   B. Transient
   C. Intransient
   D. Non-Volatile

Ans :

10. On Which Model is WWW based upon
   A. Client-Server
   B. Local-Server
   C. 3-tier
   D. None of this

Ans :

11. Identified among the following which creates Push Button
   A. Reset
   B. Check Box
   C. Input
   D. Radio

Ans :

12. Which attribute is used to provide a unique name to an HTML element?
A. id
B. Class
C. Type
D. None

Ans :

13. The smallest machines are called _____.
A. Micro Computers
B. Mini Computer
C. MicroMini Computer
D. Mainframe Computer

Ans :

14. _____defines the way in which the components of a computer are interrelated.
A. Structure
B. Function
C. Architecture
D. Organization

Ans :

15. The circuit used to store one bit of data is known as
A. Encoder
B. OR gate
C. Flip-Flop
D. Decoder

Ans :

16. Virtual Memory consists of ____
A. Static RAM
B. Dynamic RAM
C. Magnetic Memory
D. None of these

Ans :

17. Carry, Overflow, Negative, Zero results are also called _____.
A. Flag bits
B. Conditional bits
C. Status bits
D. None of these

Ans :

18. _____ Control unit determines the address of the next instruction be executed and loads it into the program counter.
A. Instruction Interpretation
B. Instruction Sequencing
C. Instruction Regulation
D. Instruction Composition

Ans :

19. What is the maximum number of children a node can have in an N-ary tree?

A. 2
B. 0
C. 1
D. N

Ans :

20. Which one of the following is an application of Stack Data Structure?

A. Managing function calls
B. The stock span problem
C. Arithmetic expression evaluation
D. All the above

Ans :

21. What is the value of the Prefix expression +-9 2 7?

A. 10
B. 4
C. 17
D. 14

Ans :

22. While evaluating a prefix expression, the string is read from?

A. left to right
B. right to left
C. centre to right
D. centre to left to right

Ans :

23. The number of edges from the root to the node is called _____ of the tree.

A. Height
B. Depth
C. Length
D. Width

Ans :

24. What is the time complexity to count the number of elements in the linked list?

A. O(1)
B. O(n)
C. O(logn)
D. $O(n^2)$

Ans :

25._____ Conversion involves three techniques: line coding,block coding, scrambling;.

A. Analog-to-digital
B. Digital-to-analog
C. Analogy-to-analogy
D. Digital-to-Digital

Ans :

26. Where is a hub specified in the OSI model?

A. Session layer
B. Physical layer
C. Data Link layer
D. Application layer

Ans :

27. In _____ cryptography, the same key is used in both directions.

A. Symmetric key
B. Asymmetric key
C. Public key
D. None of the above

Ans :

28.Communication at the data-link layer is _____.

A. End-to-end
B. Node to node
C. Process to process
D. None of the above

Ans :

29. Which multiplexing techniques is used for digital signals?

A. FDM
B. TDM
C. WDM
D. PDM

Ans :

30. What is the frequency range of the IEEE 802.11a standard?

A. 2.4 Gbps
B. 5 Gbps
C. 2.4 GHz
D. 5GHz

Ans :

31. A process which is copied from main memory to secondary memory on the basis of requirement is known as –

A. Demand paging
B. Paging
C. Threads
D. Segmentation

Ans :

32. Which of the following schedules threads?

A. Virtual memory
B. Operating system
C. CPU
D. Input

Ans :

33. Threads is not shared among which of the following?

A. stack
B. program counter
C. both program counter and stack
D. none

Ans :

34. How many minimum variables is/are required to share between processes, so as to solve the critical section problem?

A. one
B. two
C. three
D. four

Ans :

35.Which of the following is the only state transition that is initiated by the user process itself?

A. dispatch
B. wakeup
C. block
D. none

Ans :

36. Identify the call which never returns an error?

A. fork
B. getpid
C. ioctl
D. open

Ans :

37. Arrays in java are-

A. Object references
B. Objects
C. Primitive data type
D. None

Ans :

38. Identify the prototype of the default constructor.

Public class Solution {}

A. Solution(void)
B. Solution()
C. public Solution(void)
D. public Solution()

Ans :

39. Automatic type conversion is possible in which of the possible cases?
A. Byte to int
B. Int to long
C. Long to int
D. Short to int

Ans :

40. Select the valid statement.
A. char[] ch = new char(5)
B. char[] ch = new char[5]
C. char[] ch = new char()
D. char[] ch = new char[]

Ans :

41. In which of the following is toString() method defined?
A. java.lang.Object
B. java.lang.String
C. java.lang.util
D. None

Ans :

42. Find the output of the following code.

```
int ++a = 100;
System.out.println(++a);
```

A. 101
B. Compile error as ++a is not valid identifier
C. 100
D. None

Ans :

43. Which keyword is used for function in Python language?
A. Function
B. def
C. Fun
D. Define

Ans :

44. Which of the following is a Python tuple?
A. {1,2,3}
B. [1,2,3]
C. { }
D. (1,2,3)

Ans :

45. Where are the arguments received from the command line stored?
    A. sys.argv
    B. os.argv
    C. argv
    D. None of these

Ans :

46. Which operator is overloaded by the or() function?
    A. ||
    B. |
    C. //
    D. /

Ans :

47. Which of the following functions does not necessarily accept only iterables as arguments?
    A. enumerate()
    B. all()
    C. chr()
    D. max()

Ans :

48. What will be the output of the following Python code?

```
print("Hello {0[0]} and {0[1]}".format(('foo', 'bin')))
```

    A. Hello ('foo', 'bin') and ('foo', 'bin')
    B. Error
    C. Hello foo and bin
    D. None of these

Ans :

49. What does pip stand for Python?
    A. Pip Installs Python
    B. Pip Installs Packages
    C. Preferred Installer Program
    D. All the above

Ans :

50. Which of these about a frozenset is not true?
    A. Mutable data type
    B. Allows duplicate values
    C. Data type with unordered values
    D. Immutable data type

Ans :

---------- ALL THE BEST ----------