**DBMS and Data Models (25 Tough MCQs)**

1. In a **relational database**, which condition must hold for a relation to be in **Boyce-Codd Normal Form (BCNF)**?  
   a) Every determinant must be a superkey  
   b**)** Every functional dependency must involve a candidate key  
   c) No partial dependencies should exist  
   d) No multivalued dependencies should exist
2. **Which of the following anomalies is most likely to occur in an unnormalized database?**  
   a) Atomicity Violation  
   b) Deadlock  
   **c)** Insertion Anomaly  
   d) Page Fault
3. **In MVCC (Multiversion Concurrency Control), how does the database handle concurrent transactions?**  
   a) By rolling back conflicting transactions  
   **b)** By creating multiple snapshots of data  
   c) By enforcing strict two-phase locking  
   d) By using a shared global timestamp
4. **Which of the following techniques minimizes locking overhead in DBMS concurrency control?**  
   a) Two-Phase Locking (2PL)  
   b) Optimistic Concurrency Control  
   c) Deadlock Prevention  
   d) Strict Serializability
5. **Which of the following is a key characteristic of a distributed database system?**  
   a) Data is always replicated across all nodes  
   b) It does not require ACID compliance  
   **c)** Transactions can span multiple nodes  
   d) Only NoSQL databases are distributed
6. **In a relational model, which type of join produces the Cartesian product of two relations?**  
   a) INNER JOIN  
   b) OUTER JOIN  
   **c)** CROSS JOIN  
   d) SEMI JOIN
7. **Which of the following indexes is best suited for high-cardinality attributes?**  
   a) Hash Index  
   b) Bitmap Index  
   **c)** Clustered Index  
   d) B-Tree Index
8. **What is the major drawback of a self-referential foreign key in a hierarchical database model?**  
   a) Increased normalization complexity  
   **b)** Requires recursion for queries  
   c) Violates 3NF constraints  
   d) Reduces indexing efficiency
9. **Which query execution strategy is most efficient when searching for a specific record in a large table?**  
   a) Full Table Scan  
   **b)** Index Seek  
   c) Nested Loop Join  
   d) Hash Join
10. **Which of the following statements about NoSQL databases is true?**  
    a) NoSQL databases never support ACID properties  
    b) They are only suitable for structured data  
    c) They scale horizontally better than relational databases  
    **d)** They are always schema-less
11. **Which condition must be met for a transaction to be in a recoverable schedule?**  
    a) It should follow strict two-phase locking  
    **b)** No transaction should commit before all transactions it depends on  
    c) It must use MVCC  
    d) Deadlock must be avoided
12. **Which of the following operations requires a temporary table in query execution?**  
    a) Hash Join  
    **b)** Merge Join  
    c) ORDER BY with GROUP BY  
    d) Indexed Nested Loop
13. **In a DBMS, what does shadow paging primarily aim to achieve?**  
    a) Reduce disk I/O  
    **b)** Improve indexing performance  
    c) Ensure atomicity and durability  
    d) Optimize query execution
14. **Which SQL clause ensures that only unique values appear in a column?**  
    a) CHECK  
    **b)** UNIQUE  
    c) DISTINCT  
    d) PRIMARY KEY
15. **What is the primary advantage of using an LSM (Log-Structured Merge) tree over a traditional B-Tree in databases?**  
    a) Faster in-memory operations  
    b) Better performance for read-heavy workloads  
    **c)** More efficient for write-heavy workloads  
    d) Allows recursive queries
16. **Which of the following causes the "phantom read" anomaly in transactions?**  
    a) Dirty Reads  
    b) Non-Repeatable Reads  
    c) Concurrent Insertions  
    d) Lost Updates
17. **Which of the following SQL operations is not supported in a read-uncommitted isolation level?**  
    a) SELECT  
    b) DELETE  
    c) UPDATE  
    d) None, all are supported
18. **Which type of dependency exists when a non-key attribute depends on another non-key attribute?**  
    a) Functional Dependency  
    **b)** Transitive Dependency  
    c) Partial Dependency  
    d) Multivalued Dependency
19. **What is the primary advantage of denormalization in a data warehouse?**  
    a) Reduces storage space  
    b) Improves read query performance  
    c) Prevents redundant data  
    **d)** Eliminates foreign key constraints
20. **Which technique helps avoid index fragmentation in DBMS?**  
    **a)** Hash Partitioning  
    b) Page Splitting  
    c) Index Rebuilding  
    d) Rollback Segmentation
21. **Which query execution plan is best suited for a dataset with skewed distribution?**  
    a) Cost-Based Optimizer (CBO)  
    **b)** Rule-Based Optimizer (RBO)  
    c) Dynamic Sampling  
    d) Query Caching
22. **Which of the following is an advantage of columnar databases over row-based databases?**  
    **a)** Faster transactional updates  
    b) Improved analytical query performance  
    c) Better support for JSON data  
    d) More efficient row locking
23. **What is the role of the undo log in database transactions?**  
    a) Store completed transactions  
    **b)** Roll back uncommitted changes  
    c) Maintain metadata history  
    d) Control user privileges
24. **Which scheduling strategy ensures serializability in concurrent transactions?**  
    **a)** Strict Two-Phase Locking  
    b) Graph-Based Locking  
    c) Starvation-Free Scheduling  
    d) Deadlock-Free Scheduling
25. **What is the main reason for using buffer pool management in databases?**  
    a) To optimize SQL execution time  
    **b)** To reduce direct disk access latency  
    c) To improve user authentication  
    d) To store query plans

**ETL Concepts (25 Tough MCQs)**

1. **In an ETL process, which technique ensures referential integrity before loading data?**  
   a) Surrogate Key Mapping  
   b) Lookup Transformation  
   c) Change Data Capture  
   d) Data Deduplication
2. **Which ETL performance tuning method minimizes data staging bottlenecks?**  
   a) Batch Processing  
   b) Pushdown Optimization  
   c) Lookup Caching  
   d) Incremental Extraction
3. **What is the primary function of a staging area in ETL?**  
   a) To store transactional data permanently  
   b) To validate and clean data before transformation  
   c) To improve query performance in a data warehouse  
   d) To store metadata information
4. **Which transformation type is best suited for complex hierarchical data structures in ETL?**  
   a) Normalizer Transformation  
   b) Aggregator Transformation  
   c) Router Transformation  
   d) Expression Transformation
5. **Which of the following ensures that an ETL process handles real-time data updates efficiently?**  
   a) Bulk Load Processing  
   b) Change Data Capture (CDC)  
   c) Batch Scheduling  
   d) Hash Partitioning
6. **Which ETL technique improves processing time by loading only modified data?**  
   a) Full Refresh  
   b) Incremental Loading  
   c) Parallel Extraction  
   d) Surrogate Key Updates
7. **Which data quality issue is typically resolved using deduplication in ETL?**  
   a) Schema Drift  
   b) Inconsistent Data Formats  
   c) Redundant Records  
   d) Missing Foreign Keys
8. **What is the key disadvantage of using ELT instead of ETL?**  
   a) Increased processing overhead  
   b) Requires high storage capacity  
   c) Poor data validation  
   d) Inefficient for real-time processing
9. **Which transformation ensures surrogate key generation in ETL?**  
   a) Sequence Generator  
   b) Rank Transformation  
   c) Filter Transformation  
   d) Router Transformation
10. **In ETL, which of the following improves data consistency across multiple source systems?**  
    a) Schema Reconciliation  
    b) Data Profiling  
    c) Incremental Updates  
    d) Data Aggregation
11. **Which technique ensures that ETL loads are optimized for high-volume data?**  
    a) Indexing on Fact Tables  
    b) Partitioning Strategies  
    c) Normalization of Dimensions  
    d) Full Table Scans
12. **Which ETL testing approach ensures that source-to-target mappings are correct?**  
    a) Functional Testing  
    b) Data Reconciliation Testing  
    c) Performance Testing  
    d) Metadata Validation
13. **Which component is responsible for error handling in an ETL pipeline?**  
    a) Exception Handling Framework  
    b) Surrogate Key Management  
    c) Query Optimizer  
    d) Data Aggregation
14. **Which type of partitioning ensures that an ETL job distributes data evenly across processing nodes?**  
    a) Hash Partitioning  
    b) Range Partitioning  
    c) Composite Partitioning  
    d) Round-Robin Partitioning
15. **In a real-time ETL architecture, which factor affects the choice between push-based and pull-based data ingestion?**  
    a) Query Optimization Strategy  
    b) Network Latency  
    c) Schema Normalization  
    d) Data Redundancy
16. **What is the primary purpose of a surrogate key in ETL?**  
    a) To enforce referential integrity  
    b) To replace natural keys for better performance  
    c) To increase query complexity  
    d) To reduce redundancy in transactional data
17. **Which ETL scheduling method ensures the best resource utilization for large data loads?**  
    a) Event-Driven Scheduling  
    b) Time-Based Scheduling  
    c) Manual Batch Scheduling  
    d) Query-Based Scheduling
18. **Which factor affects ETL performance the most?**  
    a) Number of Data Pipelines  
    b) Use of Surrogate Keys  
    c) ETL Logging Strategy  
    d) Parallel Processing
19. **Which scenario requires an SCD Type 3 implementation in ETL?**  
    a) Tracking only the current state of a record  
    b) Retaining only historical values  
    c) Storing both current and previous values in the same row  
    d) Maintaining multiple versions of historical data
20. **Which ETL concept ensures that only cleaned and validated data is loaded into the warehouse?**  
    a) Data Scrubbing  
    b) Schema Mapping  
    c) Data Transformation  
    d) Change Data Capture
21. **Which ETL technique enhances real-time analytics by reducing latency in data updates?**  
    a) Near-Real-Time Processing  
    b) Batch Processing  
    c) Periodic Data Refresh  
    d) Data Archiving
22. **Which issue is most commonly faced when integrating multiple heterogeneous data sources?**  
    a) Schema Drift  
    b) Query Optimization  
    c) Transaction Deadlocks  
    d) Reduced Indexing Efficiency
23. **Which of the following ensures ETL compliance with GDPR and other data regulations?**  
    a) Data Masking  
    b) Query Optimization  
    c) Indexing Strategy  
    d) Surrogate Key Generation
24. **Which factor determines whether an ETL tool should be cloud-based or on-premises?**  
    a) Data Volume and Processing Speed  
    b) Number of End Users  
    c) Use of NoSQL Databases  
    d) Level of Normalization
25. **Which transformation is typically used for aggregating large data sets before loading into a data warehouse?**  
    a) Aggregator Transformation  
    b) Rank Transformation  
    c) Lookup Transformation  
    d) Filter Transformation

**Data Warehouse Testing (25 Tough MCQs)**

1. **Which testing method ensures that ETL processes handle duplicate records correctly?**  
   a) Data Integrity Testing  
   b) Regression Testing  
   c) Performance Testing  
   d) Deduplication Testing
2. **In data warehouse testing, what is the primary purpose of data reconciliation?**  
   a) To check query performance  
   b) To validate source-to-target data consistency  
   c) To optimize storage  
   d) To ensure data encryption
3. **Which test case verifies that surrogate keys are assigned correctly during ETL processing?**  
   a) Functional Testing  
   b) Primary Key Testing  
   c) Referential Integrity Testing  
   d) Surrogate Key Testing
4. **Which SQL technique is most effective for identifying missing records in data warehouse testing?**  
   a) INNER JOIN  
   b) LEFT OUTER JOIN with NULL Check  
   c) FULL OUTER JOIN  
   d) SELF JOIN
5. **What is the biggest challenge in data warehouse performance testing?**  
   a) Handling real-time updates  
   b) Identifying data duplication  
   c) Simulating production-level data volume  
   d) Data archiving
6. **Which validation technique ensures that ETL transformations apply correct business rules?**  
   a) Metadata Testing  
   b) Data Transformation Testing  
   c) Database Migration Testing  
   d) Data Retention Testing
7. **Which scenario requires delta testing in a data warehouse?**  
   a) Validating slowly changing dimensions  
   b) Verifying surrogate key mapping  
   c) Checking full data loads  
   d) Ensuring only new/updated records are loaded
8. **Which tool is commonly used for automated data warehouse testing?**  
   a) Selenium  
   b) Apache JMeter  
   c) QuerySurge  
   d) LoadRunner
9. **Which test case ensures that historical data is retained correctly in an SCD Type 2 implementation?**  
   a) Data Profiling  
   b) Historical Data Verification  
   c) ETL Logging Check  
   d) Performance Testing
10. **Which data warehouse testing method ensures compliance with business reporting needs?**  
    a) Functional Testing  
    b) BI Report Testing  
    c) ETL Process Validation  
    d) Data Retention Testing
11. **Which SQL technique is best for verifying data consistency across multiple partitions?**  
    a) Window Functions  
    b) Recursive CTE  
    c) UNION with Aggregation  
    d) Hash Comparison
12. **Which challenge is most common in automated data warehouse testing?**  
    a) Maintaining query execution logs  
    b) Handling schema changes dynamically  
    c) Managing source-to-target mappings  
    d) Testing relational constraints
13. **Which data warehouse component requires stress testing the most?**  
    a) ETL Pipelines  
    b) Metadata Repository  
    c) Data Marts  
    d) Reporting Layer
14. **Which factor is crucial in performance testing of complex OLAP queries?**  
    a) Number of Joins  
    b) Database Indexing Strategy  
    c) Query Execution Plan  
    d) Number of Reports Generated
15. **Which technique ensures that row counts match between source and target after ETL execution?**  
    a) Row Count Testing  
    b) Query Profiling  
    c) Metadata Verification  
    d) Surrogate Key Matching
16. **Which issue is most common when validating data warehouse aggregations?**  
    a) Incorrect granularity levels  
    b) Primary key mismatches  
    c) Normalization errors  
    d) ETL job failures
17. **Which technique is used to validate large-scale data movement in ETL jobs?**  
    a) Data Sampling  
    b) Full Volume Comparison  
    c) Hash-Based Validation  
    d) Incremental Processing
18. **Which warehouse testing strategy ensures that queries perform optimally under load?**  
    a) Performance Benchmarking  
    b) Functional Validation  
    c) Data Profiling  
    d) Schema Comparison
19. **Which aspect is validated in warehouse backup and recovery testing?**  
    a) Data Retention Policy  
    b) Indexing Strategy  
    c) Transaction Logs  
    d) Rollback Procedures
20. **Which approach ensures that data warehouse reports reflect the most up-to-date information?**  
    a) Data Synchronization Testing  
    b) Query Optimization Testing  
    c) Metadata Testing  
    d) Data Partitioning Testing
21. **Which warehouse testing technique ensures that aggregated measures are computed correctly?**  
    a) OLAP Drill-Through Validation  
    b) Query Execution Analysis  
    c) Schema Drift Detection  
    d) Dimensional Modeling Testing
22. **Which aspect is commonly tested in near-real-time data warehouses?**  
    a) Batch Processing Times  
    b) Data Latency in Reports  
    c) Table Normalization  
    d) Surrogate Key Consistency
23. **Which factor is critical in ETL error handling testing?**  
    a) Logging of rejected records  
    b) Query Performance Optimization  
    c) Schema Migration Strategy  
    d) Report Generation Time
24. **Which issue is identified by schema drift testing in data warehouse environments?**  
    a) Changes in source column structures  
    b) Foreign key violations  
    c) Slow query performance  
    d) Incorrect data partitioning
25. **Which scenario requires lineage testing in a data warehouse?**  
    a) Tracking data transformations across multiple stages  
    b) Monitoring concurrent ETL processes  
    c) Optimizing aggregation strategies  
    d) Validating real-time reporting queries

**Unix & Shell Scripting (25 Tough MCQs)**

1. **Which command is used to replace all occurrences of "foo" with "bar" in a file, without modifying the original file?**  
   a) sed -i 's/foo/bar/g' file.txt  
   b) awk '{gsub(/foo/, "bar")}1' file.txt  
   c) grep -r 'foo' file.txt | sed 's/foo/bar/g'  
   d) tr 'foo' 'bar' < file.txt
2. **Which shell built-in command prevents a script from terminating upon an error?**  
   a) trap ERR  
   b) set -e  
   c) set +e  
   d) exec 2>/dev/null
3. **Which scheduling command executes a script at 3:15 PM on the last Friday of every month?**  
   a) cron 15 15 \* \* 5 script.sh  
   b) cron 15 15 \* \* 4L script.sh  
   c) at 15:15 -f script.sh  
   d) crontab -e 15 15 \* \* F script.sh
4. **Which of the following is a correct way to check if a file exists and is not empty?**  
   a) [ -f "$file" ] && [ -s "$file" ]  
   b) if test -n "$file"; then  
   c) [ -e "$file" -a "$file" -gt 0 ]  
   d) [[ -d $file ]] && echo "Exists"
5. **What will the command ls | sort | tee output.txt | wc -l do?**  
   a) List files, sort them, store in output.txt, and count lines  
   b) Sort output.txt and display it  
   c) Count the number of files without writing to output.txt  
   d) Only write sorted output to output.txt
6. **Which of the following creates a named pipe (FIFO) in Unix?**  
   a) mkfifo mypipe  
   b) mknod mypipe p  
   c) touch mypipe | chmod +p  
   d) pipe create mypipe
7. **Which is the correct way to run a script myscript.sh in the background and disown it?**  
   a) nohup myscript.sh & disown  
   b) ./myscript.sh & exit  
   c) nohup myscript.sh > /dev/null 2>&1 &  
   d) bg myscript.sh && disown
8. **Which of the following ensures that a shell script waits until a background process completes?**  
   a) fg %1  
   b) wait $!  
   c) exec &  
   d) jobs -w
9. **Which command is used to extract only unique lines from a sorted file?**  
   a) uniq -u file.txt  
   b) sort -u file.txt  
   c) grep -v duplicate file.txt  
   d) awk '!seen[$0]++' file.txt
10. **What is the result of echo '12 15 17' | awk '{print $1\*$2}'?**  
    a) 180  
    b) 12 15 17  
    c) Syntax Error  
    d) 15
11. **How can you recursively find all symbolic links in /usr/local/bin?**  
    a) find /usr/local/bin -type l  
    b) ls -Rlh /usr/local/bin | grep '^l'  
    c) grep -r '^l' /usr/local/bin  
    d) locate -S /usr/local/bin
12. **Which command removes duplicate consecutive lines from a file?**  
    a) uniq file.txt  
    b) sort file.txt | uniq  
    c) awk '!a[$0]++' file.txt  
    d) cat file.txt | dedup
13. **Which of the following correctly assigns a value to a variable in a shell script?**  
    a) VAR = "hello"  
    b) VAR="hello"  
    c) VAR : "hello"  
    d) VAR->$hello
14. **Which of the following prevents a shell script from being executed in an interactive session?**  
    a) if [[ $- != \*i\* ]]; then exit; fi  
    b) trap "exit" INT  
    c) set -x  
    d) exec < /dev/null
15. **Which command redirects both stdout and stderr to /dev/null?**  
    a) command > /dev/null 2>&1  
    b) command > /dev/null  
    c) command 2> /dev/null 1>&2  
    d) command 1>2
16. **What will happen if a script calls exec on another script?**  
    a) The calling script is replaced by the new script  
    b) Both scripts execute in parallel  
    c) The calling script resumes execution after the new script finishes  
    d) A new process is created to run the new script
17. **What does set -o noclobber do?**  
    a) Prevents overwriting existing files with > redirection  
    b) Enables case-insensitive pattern matching  
    c) Disables filename expansion  
    d) Allows overwriting files in read-only mode
18. **What is the effect of exec 3<> filename in a script?**  
    a) Opens filename for both reading and writing on file descriptor 3  
    b) Closes file descriptor 3  
    c) Redirects standard output to filename  
    d) Creates a background process using filename
19. **Which signal is sent to terminate a process without allowing cleanup?**  
    a) kill -9  
    b) kill -15  
    c) kill -HUP  
    d) kill -STOP
20. **How can you find the 10 largest files in /var/log?**  
    a) ls -lhS /var/log | head -10  
    b) find /var/log -type f -exec du -h {} + | sort -rh | head -10  
    c) du -a /var/log | sort -n | tail -10  
    d) locate /var/log -size +10M | sort -r
21. **Which command ensures that a script runs with the correct interpreter, even if executed without specifying it?**  
    a) #!/bin/bash at the start of the script  
    b) exec -shell bash  
    c) chmod +x script.sh  
    d) source script.sh
22. **How can you display only the third column from a space-separated file?**  
    a) awk '{print $3}' file.txt  
    b) cut -f3 file.txt  
    c) grep -o '^[^ ]\* [^ ]\* [^ ]\*' file.txt  
    d) sed -n 's/^[^ ]\* [^ ]\* \([^ ]\*\).\*/\1/p' file.txt
23. **What does ulimit -n control?**  
    a) Maximum number of open file descriptors per process  
    b) Maximum number of background processes  
    c) Maximum file size allowed for a user  
    d) Maximum process memory usage
24. **Which command recursively finds all empty files in a directory?**  
    a) find . -type f -empty  
    b) ls -lh | grep ' 0 '  
    c) du -a | awk '$1==0'  
    d) locate -e .
25. **What will echo $(seq 1 5) | xargs -n 2 output?**  
    a) 1 2  
    b) 1 2\n3 4\n5  
    c) 1\n2\n3\n4\n5  
    d) Error: Invalid Argument

**XML Fundamentals (25 Tough MCQs)**

1. **Which of the following best describes a well-formed XML document?**  
   a) Contains at least one root element and all tags are properly nested  
   b) Must have a DTD or XML Schema  
   c) Uses only predefined XML tags  
   d) Cannot contain attributes
2. **Which statement is true about XML namespaces?**  
   a) XML namespaces are defined using the xmlns attribute  
   b) Multiple namespaces cannot be used in a single document  
   c) Namespace prefixes are mandatory in XML  
   d) A namespace must be declared in the DTD
3. **Which of the following is NOT a valid XML name?**  
   a) \_element123  
   b) xmlElement  
   c) 1Element  
   d) Element-Name
4. **What is the purpose of an XML Schema (XSD)?**  
   a) Defines the structure and data types of an XML document  
   b) Converts XML to JSON  
   c) Specifies how an XML document should be displayed in a browser  
   d) Removes invalid elements from an XML file
5. **Which of the following DTD declarations correctly defines an attribute with a default value?**  
   a) <!ATTLIST book category CDATA "Fiction">  
   b) <!ELEMENT book (category)>  
   c) <!ENTITY book "category">  
   d) <!DOCTYPE book SYSTEM "book.dtd">
6. **Which XPath expression selects all <title> elements that are children of <book>?**  
   a) /book/title  
   b) //book/title  
   c) ./title  
   d) title/book
7. **What is the purpose of CDATA in an XML document?**  
   a) To include character data without parsing special characters  
   b) To define an attribute  
   c) To add comments within an XML document  
   d) To validate an XML file
8. **Which of the following is NOT true about XML Schema (XSD)?**  
   a) It allows data type enforcement in XML documents  
   b) It is an alternative to DTD  
   c) It supports namespaces  
   d) It cannot enforce order of elements
9. **Which XML parser processes an XML document in a sequential, event-driven manner?**  
   a) DOM Parser  
   b) SAX Parser  
   c) XSLT Processor  
   d) JSON Parser
10. **Which XSLT element is used to apply templates to nodes in an XML document?**  
    a) <xsl:apply-templates>  
    b) <xsl:template>  
    c) <xsl:for-each>  
    d) <xsl:match>
11. **Which of the following is a valid XML comment?**  
    a) <!-- This is a comment -->  
    b) <!— This is a comment -->  
    c) <-- This is a comment -->  
    d) <?-- This is a comment -->
12. **What will be the result of an XML document missing a required element in an XSD validation?**  
    a) The document will be rejected as invalid  
    b) The element will be automatically added  
    c) The XML parser will ignore the missing element  
    d) The validation process will continue without error
13. **Which XML API is typically used in Java applications for XML parsing?**  
    a) JAXP  
    b) JSON.parse  
    c) RESTful API  
    d) HTTP Parser
14. **In an XML document, how are attributes different from elements?**  
    a) Attributes store metadata, while elements store structured content  
    b) Attributes can contain nested elements  
    c) Elements cannot have text values  
    d) Attributes are not allowed in XML
15. **Which XML technology is used for querying and extracting specific data from XML documents?**  
    a) XPath  
    b) XSLT  
    c) SAX  
    d) DOM
16. **Which of the following XML elements is NOT a valid root element?**  
    a) <\_root>  
    b) <123root>  
    c) <Root-Element>  
    d) <rootElement>
17. **Which function in XPath retrieves the number of child nodes of a specific element?**  
    a) count(node-set)  
    b) child-count()  
    c) size(node-set)  
    d) node-count()
18. **Which XML concept ensures that an XML document follows a specific structure?**  
    a) XML Schema (XSD)  
    b) XML Namespaces  
    c) XSLT  
    d) XPath
19. **What happens when an XML file is well-formed but does not conform to a DTD or Schema?**  
    a) It can still be parsed but may not be valid  
    b) It is automatically corrected  
    c) It cannot be processed by any XML parser  
    d) It will be converted to JSON
20. **Which of the following statements about XML encoding is true?**  
    a) UTF-8 is the default encoding for XML  
    b) XML does not support character encoding  
    c) XML only supports ASCII characters  
    d) Encoding is optional in XML declarations
21. **Which XSLT tag is used to loop through multiple elements in XML?**  
    a) <xsl:for-each>  
    b) <xsl:iterate>  
    c) <xsl:apply-templates>  
    d) <xsl:if>
22. **Which of the following is true about XML element order?**  
    a) XML elements must appear in the order defined by a DTD or Schema  
    b) XML elements can appear in any order  
    c) XML does not support ordered elements  
    d) Order of elements does not matter if they have attributes
23. **Which method is the fastest for parsing large XML documents?**  
    a) SAX Parser  
    b) DOM Parser  
    c) XSLT Processor  
    d) JSON Parser
24. **What is the purpose of an XML Digital Signature?**  
    a) Ensures data integrity and authenticity  
    b) Encrypts XML content  
    c) Converts XML to binary format  
    d) Generates random UUIDs for XML elements
25. **Which command-line tool is used for XML validation?**  
    a) xmllint  
    b) xmlgrep  
    c) jsonlint  
    d) xmlconvert

**JSON Fundamentals (25 Tough MCQs)**

1. **Which of the following is NOT a valid JSON data type?**  
   a) String  
   b) Boolean  
   c) Date  
   d) Null
2. **What is the main difference between JSON and XML?**  
   a) JSON uses tags, whereas XML uses key-value pairs  
   b) JSON is human-readable, whereas XML is not  
   c) JSON is lightweight and supports arrays, while XML does not  
   d) JSON is stricter in syntax than XML
3. **Which of the following JSON structures is valid?**  
   a) { "name": "Alice", "age": 25, "address": { "city": "New York" } }  
   b) { name: "Alice", "age": 25, "city": "New York" }  
   c) { "name": "Alice", "age": 25, "address": ["city": "New York"] }  
   d) { "name" => "Alice", "age" => 25, "city" => "New York" }
4. **Which of the following JSON elements is an example of an array?**  
   a) { "cities": ["New York", "London", "Tokyo"] }  
   b) { "cities": {"New York", "London", "Tokyo"} }  
   c) { "cities": "New York", "London", "Tokyo" }  
   d) { "cities": [New York, London, Tokyo] }
5. **What does JSON.stringify() do in JavaScript?**  
   a) Converts JSON data into a JavaScript object  
   b) Converts a JavaScript object into a JSON string  
   c) Parses an XML file into JSON  
   d) Removes whitespace from JSON data
6. **Which of the following is a valid JSON number?**  
   a) "123"  
   b) 0123  
   c) 123.45  
   d) 12,345
7. **What will happen if a trailing comma is present in a JSON object?**  
   a) It will be ignored  
   b) It will cause a syntax error  
   c) It will convert the JSON object to an array  
   d) It will be treated as a new key-value pair
8. **Which of the following methods can parse a JSON string into a JavaScript object?**  
   a) JSON.parse()  
   b) JSON.stringify()  
   c) JSON.decode()  
   d) JSON.load()
9. **Which of these is a security concern when handling JSON data?**  
   a) Excessive whitespace  
   b) Cross-Site Scripting (XSS)  
   c) Lack of closing tags  
   d) Missing semicolons
10. **Which of the following is a valid way to represent boolean values in JSON?**  
    a) "true"  
    b) true  
    c) "false"  
    d) both b and c
11. **What happens if a JSON file contains duplicate keys?**  
    a) It is considered invalid JSON  
    b) The first occurrence of the key is retained  
    c) The last occurrence of the key is retained  
    d) It throws a syntax error when parsed
12. **Which of the following is NOT supported in JSON?**  
    a) Arrays  
    b) Multi-line comments  
    c) Nested objects  
    d) Null values
13. **Which file extension is commonly used for JSON files?**  
    a) .json  
    b) .jsn  
    c) .txt  
    d) .xml
14. **How is whitespace treated in JSON?**  
    a) It is ignored when parsing  
    b) It must be minimized for JSON to be valid  
    c) It changes how the data is interpreted  
    d) It is required between key-value pairs
15. **What will JSON.parse('{"a": undefined}') return?**  
    a) { "a": undefined }  
    b) SyntaxError  
    c) null  
    d) { "a": null }
16. **Which function is used to convert a JavaScript object into a JSON string with indentation?**  
    a) JSON.stringify(obj, null, 4)  
    b) JSON.toString(obj)  
    c) JSON.format(obj)  
    d) JSON.parse(obj)
17. **What does the third parameter in JSON.stringify(obj, null, 4) do?**  
    a) Specifies the indentation level  
    b) Removes null values  
    c) Converts the object into an array  
    d) Ignores non-primitive values
18. **Which of the following is a proper way to access the value of "name" in the following JSON object?**

json

Copy code

{ "user": { "name": "Alice" } }

a) json.user["name"]  
b) json.user.name  
c) json["user"]["name"]  
d) All of the above

1. **What happens when trying to parse invalid JSON using JSON.parse()?**  
   a) It returns null  
   b) It throws a SyntaxError  
   c) It returns undefined  
   d) It automatically fixes the errors
2. **Which of the following is true about JSONP (JSON with Padding)?**  
   a) It is a secure way to bypass CORS restrictions  
   b) It is an alternative to RESTful APIs  
   c) It allows JSON data to be retrieved via a <script> tag  
   d) It is used to compress JSON data
3. **What is the purpose of reviver in JSON.parse()?**  
   a) To modify the parsed JSON data before returning it  
   b) To validate JSON before parsing  
   c) To convert JSON into XML  
   d) To speed up JSON parsing
4. **Which data structure in JavaScript is closest to a JSON object?**  
   a) Map  
   b) Object  
   c) Set  
   d) Array
5. **What will JSON.stringify({ x: 5, y: function() { return 10; } }) return?**  
   a) "{ x: 5 }"  
   b) "{"x":5}"  
   c) "{ x: 5, y: function() { return 10; } }"  
   d) Error
6. **What is the MIME type for JSON data?**  
   a) application/json  
   b) text/json  
   c) application/x-json  
   d) text/plain
7. **Which HTTP method is most commonly used to send JSON data to a server?**  
   a) GET  
   b) POST  
   c) DELETE  
   d) HEAD