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PD - 05

Total No. of Pages : 12

Ph.D Entrance Examination March/April, 2026

COMPUTER SCIENCE

Subject Code : 58802

Day and Date : Tuesday, 06-10-2026

Total Marks : 100

Time : 04.00 p.m. to 06.00 p.m.

Instructions :

- 1) SECTION I have 25 questions and 50 marks.
- 2) SECTION II have 25 questions and 50 marks.
- 3) Total 50 questions and each question have 2 marks.

SECTION-I

Q.1..... refers to the quality of a measurement procedure that provides repeatability and accuracy.

- | | |
|---------------|------------------|
| a) Validity | b) Reliability |
| c) Philosophy | d) None of these |

Q.2 Good quality research include

- a) Methods of analysis should be appropriate
- b) Purpose should be clearly defined
- c) Validity should be check carefully.
- d) All of these

Q.3 In type of research includes surveys and fact finding enquiries of different kinds.

- | | |
|----------------|-----------------|
| a) Descriptive | b) Applied |
| c) Qualitative | d) Quantitative |

Q.4 algorithm design technique is best suited for solving problems with overlapping subproblems and optimal substructure.

- a) Greedy algorithm
- b) Divide and conquer
- c) Dynamic programming
- d) Brute force

Q.5 A research problem is feasible only when

- a) it has utility and relevance
- b) it is researchable
- c) it is new and adds something to knowledge
- d) All of these

Q.6 One step that is not included in planning a research study is

- a) identifying a researchable problem
- b) conducting a meta-analysis of the research
- c) a review of current research
- d) developing a research plan

Q.7 technique is generally followed when the population is finite.

- a) Area Sampling technique
- b) Purposive sampling technique
- c) Systematic sampling technique
- d) None of these

Q.8 Triangulation in research is

- a) Using three researchers only
- b) Using multiple methods or data sources
- c) Using three questionnaires
- d) Three hypotheses

Q.9 The depth of any research can be most accurately judged by its

- a) Research title
- b) Research duration
- c) Research objectives
- d) Total expenditure

Q.10 The two important components of research responsibility are sincerity in work and avoiding

- a) Plagiarism
- b) Writing the thesis
- c) Research techniques
- d) Confidentiality

Q.11 machine learning techniques helps in detecting the outliers in data.

- a) Classification
- b) Clustering
- c) Anomaly detection
- d) All of these

Q.12 is the role of reflection in action research.

- a) Identifying research participants
- b) Analyzing quantitative data
- c) Assessing the effectiveness of interventions
- d) Developing research questions

Q.13 An extraneous variable is also known as

- a) Artifact
- b) Contiguous factor
- c) Dependent variable
- d) Intervener

Q.14 In the independent variable is 'selected' rather than 'manipulated'?

- a) Experimental research design
- b) Historical research design
- c) Ex post-facto research design
- d) Descriptive survey research design

Q.15 Which of the following is NOT considered a form of research misconduct?

- a) Plagiarism
- b) Fabrication
- c) Peer Review
- d) Falsification

Q.16 platform is known for its collaboration tools.

- a) AWS
- b) Google workspace
- c) IBM cloud
- d) Oracle cloud

Q.17 R2 score is used in

- a) Classification
- b) Regression
- c) Clustering
- d) Natural language processing

Q.18 Testing hypothesis is a

- a) Inferential statistics
- b) Descriptive statistics
- c) Data preparation
- d) Data analysis

Q.19 Research design means

- a) A way of conducting research that is not grounded in theory
- b) The choice between using qualitative or quantitative methods
- c) The style in which you present your research findings of graph
- d) A framework for every stage of the collection, and analysis of data

Q.20 The process not needed in experimental research is

- a) Observation
- b) Manipulation and replication
- c) Controlling
- d) Reference collection

Q.21 The purpose of feature scaling?

- a) Reduce number of features
- b) Increase training data
- c) Standardize feature range
- d) Decrease model accuracy

Q.22 technique is commonly used to deal with duplicate records during data preprocessing.

- a) Feature Scaling b) Regularization
c) Cross-Validation d) Deduplication

Q.23 technique can help reduce the number of highly correlated features while retaining important information?

- a) Principal Component Analysis b) Tokenization
c) Label Encoding d) Bagging

Q.24 A literature review conducted during research

- To duplicate existing work
- To find research gaps and understand existing knowledge
- To increase the length of the thesis
- To finalize the data analysis software

Q.25 Bibliography given in a research report

- a) shows vast knowledge of the researcher
- b) helps those interested in further research
- c) has no relevance to research
- d) all these

SECTION-II

Q.26 Which of the following algorithm design paradigms is guaranteed to find an optimal solution for the Fractional Knapsack Problem, but may fail for the 0/1 Knapsack Problem?

- a) Dynamic Programming b) Divide and Conquer
c) Backtracking d) Greedy Algorithm

Q.27 In distributed database systems, what does the CAP theorem state regarding concurrent consistency, availability, and partition tolerance?

- a) A system can simultaneously satisfy all three properties under any network condition.
- b) In the presence of a network partition, a distributed system can provide at most two of the three guarantees.
- c) Partition tolerance is optional in modern distributed cloud databases.
- d) Consistency and Availability can be fully achieved without network communication.

Q.28 Which component in the Java Servlet lifecycle is invoked exactly once by the web container to initialize resources before handling any client requests?

- a) service()
- b) doGet()
- c) destroy()
- d) init()

Q.29 In the A* Search Algorithm, what property must the heuristic function $h(n)$ satisfy to guarantee that the search returns an optimal (shortest path) solution?

- a) It must always overestimate the true cost to the goal.
- b) It must be admissible, meaning $h(n)$ never exceeds the actual minimal cost to reach the goal.
- c) It must be strictly non-monotonic.
- d) It must equal zero for all non-goal nodes.

Q.30 In modern PHP (PHP 8+), which magic method is executed automatically when trying to invoke an object as if it were a function?

- a) `__construct()`
- b) `__call()`
- c) `__invoke()`
- d) `__toString()`

Q.31 When evaluating a binary classification model on highly imbalanced data, which metric provides a better performance measure than standard Accuracy?

- a) Precision-Recall AUC (PR-AUC) or F1-Score
- b) Mean Squared Error (MSE)
- c) R-Squared
- d) Mean Absolute Percentage Error (MAPE)

Q.32 Which architecture pattern decouples real-time stream processing from batch historical processing by maintaining two separate execution layers?

- a) Monolithic Architecture
- b) Lambda Architecture
- c) Microservices Architecture
- d) Peer-to-Peer Architecture

Q.33 In Android development, which component lifecycle callback is invoked when an activity is no longer visible to the user?

- a) onPause()
- b) onDestroy()
- c) onStop()
- d) onDetach()

Q.34 Which web communication mechanism allows full-duplex, persistent, bidirectional communication between a client browser and a server over a single TCP connection?

- a) HTTP Long Polling
- b) WebSockets
- c) Server-Sent Events (SSE)
- d) REST API GET requests

Q.35 In Java Concurrency, what is the key characteristic of the 'volatile' keyword when applied to a variable?

- a) It makes method execution atomic across threads.
- b) It guarantees that reads and writes are made directly to/from main memory, providing visibility.
- c) It automatically locks the object mutex on read operations.
- d) It prevents garbage collection of the marked reference.

Q.36 Which Normal Form requires that a relational table is in 3NF and every determinant is a candidate key?

- a) First Normal Form (1NF)
- b) Second Normal Form (2NF)
- c) Boyce-Codd Normal Form (BCNF)
- d) Fourth Normal Form (4NF)

Q.37 Which attack type involves an attacker intercepting and potentially altering messages between two communicating parties who believe they are directly talking to each other?

- a) Cross-Site Scripting (XSS)
- b) Man-in-the-Middle (MitM) Attack
- c) SQL Injection (SQLi)
- d) Distributed Denial of Service (DDoS)

Q.38 What is the amortized time complexity per operation for insertion and deletion in a Fibonacci Heap?

- a) $O(N)$
- b) $O(\log N)$
- c) $O(1)$
- d) $O(N \log N)$

Q.39 In modern browser Rendering Engines, what tree is constructed by combining the DOM (Document Object Model) tree and CSSOM tree before layout calculation?

- a) Shadow DOM Tree
- b) Render Tree
- c) Virtual DOM Tree
- d) Abstract Syntax Tree (AST)

Q.40 Which CSS layout module introduces a two-dimensional grid system to manage both columns and rows simultaneously?

- a) CSS Flexbox
- b) Float Layout
- c) Position Absolute
- d) CSS Grid Layout

Q.41 Which of the following vulnerabilities allows an attacker to execute malicious scripts in the browser of a victim user by injecting untrusted code into a trusted web page?

- a) Cross-Site Scripting (XSS)
- b) Buffer Overflow
- c) SQL Injection
- d) Cross-Site Request Forgery

Q.42 Which HTTP architectural constraint requires that client requests contain all necessary information for the server to fulfill them, storing no client state on the server between requests?

- a) Layered System
- b) Statelessness
- c) Cacheability
- d) Code on Demand

Q.43 In Python, what is the term for a function containing a 'yield' statement that returns an iterator capable of generating values lazily?

- a) Decorator
- b) Lambda Function
- c) Generator
- d) Context Manager

Q.44 Which machine learning algorithm family aims to build strong predictive models by sequentially training weak learners that focus on previously misclassified errors?

- a) Bagging (e.g., Random Forest)
- b) Boosting (e.g., Gradient Boosting, XGBoost)
- b) K-Means Clustering
- d) Principal Component Analysis (PCA)

Q.45 What is the worst-case time complexity of standard QuickSort algorithm when selecting the last element as the pivot without randomization on an already sorted array?

- a) $O(N^2)$
- b) $O(N \log N)$
- c) $O(N)$
- d) $O(\log N)$

Q.46 Which concurrency control protocol guarantees Serializability and prevents Cascading Aborts in relational database transactions?

- a) Basic 2PL (Two-Phase Locking)
- b) Strict 2PL (Strict Two-Phase Locking)
- c) Optimistic Concurrency Control
- d) Timestamp Ordering

Q.47 In distributed data storage frameworks like Apache Hadoop HDFS, what role does the NameNode perform?

- a) It executes map-reduce processing tasks directly.
- b) It stores raw user block data across distributed disks.
- c) It acts as the master node managing file system metadata and directory trees.
- d) It handles data serialization and network routing.

Q.48 What security mechanism prevents cross-site request forgery (CSRF) attacks in web applications?

- a) Anti-CSRF Synchronizer Tokens
- b) Disabling SSL/TLS
- c) Using HTTP GET for state-changing operations
- d) Removing CORS headers

Q.49 Which self-balancing binary search tree guarantees that the height of the tree never exceeds $2 \cdot \log^2(N+1)$ through node coloring rules?

- a) AVL Tree
- b) Red-Black Tree
- c) Splay Tree
- d) B-Tree

Q.50 In Deep Learning, which optimization algorithm maintains per-parameter adaptive learning rates based on both first (mean) and second (uncentered variance) moments of gradients?

- a) Adam (Adaptive Moment Estimation)
- b) Stochastic Gradient Descent (SGD)
- c) Adagrad
- d) RMSprop



- Rough Work -