

CODE: 60

Booklet Serial No.

Signature Invigilator

**Maulana Azad National Urdu University
PhD Computer Science
Entrance Test May 2026
Question Paper cum Answer Script**

Hall Ticket No.

OMR Serial No.

Time: 2hrs

Maximum Marks: 70

INSTRUCTIONS FOR CANDIDATES

1. Candidate should write their Hall Ticket number and OMR number on the space provided above. Candidate should not write their Hall Ticket and OMR number at any other place.
2. This question booklet contains (24) pages. The Candidate should check the booklet before taking the Test. In case of any discrepancy, a new booklet may be provided by the Invigilator.
3. The question booklet consists of Part A and Part B. Part A contains 50 multiple-choice questions, each with four options. The candidate must select the correct answer and mark the corresponding circle on the OMR sheet using a blue or black ballpoint pen. Each question carries one mark. No marks will be awarded if the correct answer is not properly marked against the corresponding question number in the OMR sheet. Further, if more than one option is marked for any question, no marks will be awarded for that question.
4. Part B consists of four descriptive questions, each carrying 5 marks. The answers must be written only in the 8-page answer booklet provided. No additional answer booklet will be issued.
5. There are no Negative marks.
6. At the end of Entrance Test, candidates are allowed to take their question booklet and handover the OMR Sheet and answer booklet to the Invigilator.

Part A
Section 1 – Research Methodology

1. If an author has citation counts of 21, 12, 4, 2, and 1, what is their h-index?
(A) 4 (B) 3
(C) 2 (D) 1
2. Which of the following is nonparametric test?
(A) ANOVA (B) t-test
(C) z-test (D) Chi-square test
3. Which type of research aims to solve immediate practical problems?
(A) Fundamental (B) Applied
(C) Descriptive (D) Analytical
4. From the following options, identify the first step in the research process:
(A) Data collection (B) Hypothesis testing
(C) Defining research problem (D) Report writing
5. Which type of research focuses on describing current conditions
(A) Experimental (B) Descriptive
(C) Historical (D) Analytical
6. Which sampling method is most commonly used in quantitative research to ensure a representative sample?
(A) Snowball sampling (B) Convenience sampling
(C) Purposive sampling (D) Simple random sampling
7. Which section of a research report includes references?
(A) Introduction (B) Methodology
(C) Appendix (D) Bibliography
8. When was copyright act enacted in India first time?
(A) 1947 (B) 1957
(C) 1973 (D) 2013

9. Which is NOT a source of secondary data?
- (A) Government reports
 - (B) Journals
 - (C) Surveys conducted by researcher
 - (D) Books
10. Which of the following ICT tool is primarily used for reference management in research?
- (A) Microsoft Excel
 - (B) Git
 - (C) Mendeley
 - (D) MATLAB
11. Experimental research is mainly used to:
- (A) Describe data
 - (B) Establish cause-effect relationship
 - (C) Collect opinions
 - (D) Study history
12. In research ethics, confidentiality means:
- (A) Sharing all data publicly
 - (B) Protecting respondent's identity
 - (C) Ignoring participants
 - (D) Publishing data
13. In a study investigating the link between coffee consumption and heart disease, smoking is found to be a confounding variable. Why is this the case?
- (A) Smoking has no relationship with coffee or heart disease.
 - (B) Researchers intentionally asked participants to smoke to see the effect.
 - (C) Smoking is correlated with coffee drinking and is also a known risk factor for heart disease.
 - (D) Smoking is the dependent variable being measured in the outcome.

14. In a perfectly symmetrical distribution, the relationship between mean, median, and mode is:
- (A) Mean > Median > Mode (B) Mean < Median < Mode
(C) Mean = Median = Mode (D) None of these
15. If sample size increases, standard error will:
- (A) Increase (B) Decrease
(C) Remain same (D) Become zero
16. The standard error of the sample mean (when population standard deviation is known) is given by:
- (A) $\sigma \times \sqrt{n}$ (B) $\sigma / \sqrt{n}$
(C) n / σ (D) $\sqrt{\sigma}$
17. If $p = 0.5$ and $n = 100$, standard error of proportion is:
- (A) 0.05 (B) 0.25
(C) 0.1 (D) 0.5
18. If variance = 16, standard deviation is:
- (A) 2 (B) 4
(C) 8 (D) 16
19. Range of data: 80, 20, 50, 60 is:
- (A) 40 (B) 50
(C) 60 (D) 70
20. $r = +1$ indicates, where r is correlation coefficient:
- (A) No relation (B) Perfect positive relation
(C) Perfect Negative relation (D) Weak relation
21. A researcher wants to show the relationship between two continuous variables. Which graph should they use?
- (A) Pie chart (B) Scatter plot
(C) Bar chart (D) Box plot

22. If n (sample size) increases (with confidence level constant), confidence interval width will:
- (A) Increase (B) Decrease
(C) Stay same (D) Become zero
23. What is "self-plagiarism"?
- (A) Copying your own work from a previous publication without citation
(B) Writing a paper alone without co-authors
(C) Using your own data for a new analysis
(D) Quoting your own previous work with full attribution
24. Degrees of freedom in 2×2 contingency table in Chi-square test is:
- (A) 1 (B) 2
(C) 3 (D) 4
25. If sample proportion = 0.6, complement proportion is:
- (A) 0.4 (B) 0.6
(C) 1.2 (D) 0

Section 2 – Computer Science

26. Which data structure follows the Last-In, First-Out (LIFO) principle?
- (A) Queue (B) Stack
(C) Linked List (D) Binary Tree
27. The time complexity of binary search on a sorted array of n elements is:
- (A) $O(n)$ (B) $O(n \log n)$
(C) $O(1)$ (D) $O(\log n)$
28. Which of the following is NOT a feature of Object-Oriented Programming?
- (A) Normalization (B) Polymorphism
(C) Encapsulation (D) Inheritance

29. In a relational database, which normal form eliminates partial dependency?
- (A) First Normal Form (1NF)
 - (B) Second Normal Form (2NF)
 - (C) Third Normal Form (3NF)
 - (D) Boyce-Codd Normal Form (BCNF)
30. Which of the following sorting algorithms has the best average-case time complexity?
- (A) Bubble Sort
 - (B) Insertion Sort
 - (C) Merge Sort
 - (D) Selection Sort
31. The OSI model has how many layers?
- (A) 4
 - (B) 5
 - (C) 6
 - (D) 7
32. Which of the following is a supervised machine learning algorithm?
- (A) K-Means Clustering
 - (B) Principal Component Analysis
 - (C) DBSCAN
 - (D) Support Vector Machine
33. In computer networks, the protocol used for secure data transmission over the internet is:
- (A) HTTPS (TLS/SSL)
 - (B) FTP
 - (C) SMTP
 - (D) HTTP
34. Which of the following best describes a deadlock in operating systems?
- (A) A situation where a process uses 100% CPU
 - (B) A situation where two or more processes are waiting indefinitely for each other to release resources
 - (C) A system crash caused by memory overflow
 - (D) A condition where the CPU scheduler fails to allocate time slots
35. In cryptography, RSA is classified as which type of encryption?
- (A) Symmetric key encryption
 - (B) Hashing
 - (C) Asymmetric key encryption
 - (D) Stream cipher

36. Which of the following graph traversal algorithms uses a queue data structure?
- (A) Breadth-First Search (DFS) (B) Depth-First Search (BFS)
(C) Dijkstra's Algorithm (D) Bellman-Ford Algorithm
37. The concept of 'virtual memory' in operating systems refers to:
- (A) RAM physically installed on the motherboard
(B) Memory allocated on the GPU
(C) A technique that gives programs the illusion of more memory than physically available by using disk space
(D) Cache memory used to speed up CPU operations
38. Which SQL clause is used to filter records after grouping?
- (A) WHERE (B) HAVING
(C) GROUP BY (D) ORDER BY
39. In the context of compiler design, which phase converts a stream of characters into tokens?
- (A) Syntax Analysis (B) Semantic Analysis
(C) Lexical Analysis (D) Code Generation
40. Which of the following is a characteristic of a B+ Tree compared to a B-Tree?
- (A) B+ Trees store data only in internal nodes
(B) B+ Trees do not support range queries
(C) All data records are stored at the leaf level, and leaves are linked in B+ Trees
(D) B+ Trees cannot be used in database indexing
41. Which scheduling algorithm may lead to "Starvation"?
- (A) Shortest Job First (SJF) (B) Round Robin
(C) First Come First Served (FCFS) (D) Multi-level Feedback Queue
42. Which of the following activation functions is most commonly used in the output layer of a binary classification neural network?
- (A) ReLU (B) Tanh
(C) Sigmoid (D) Softmax

43. In software engineering, the Agile methodology is best described as:
- (A) A rigid, plan-driven approach with fixed requirements
 - (B) An iterative, flexible approach that accommodates changing requirements through short development cycles
 - (C) A process that avoids documentation entirely
 - (D) A single-phase development process culminating in one major release
44. Which of the following is an NP-complete problem?
- (A) Sorting a list of integers
 - (B) Finding the shortest path in a weighted graph (Dijkstra)
 - (C) Matrix multiplication
 - (D) Boolean Satisfiability (SAT)
45. The "Waterfall Model" is characterized by:
- (A) Sequential phases
 - (B) Iterative development
 - (C) Rapid prototyping
 - (D) Risk assessment at each step
46. Which of the following is a valid IPv6 address format?
- (A) 192.168.1.1
 - (B) 255.255.255.0
 - (C) 2001:0db8:85a3:0000:0000:8a2e:0370:7334
 - (D) 10.0.0.1/24
47. In the context of convolutional neural networks (CNNs), the purpose of a pooling layer is to:
- (A) Apply non-linear activation to feature maps
 - (B) Reduce the spatial dimensions of feature maps while retaining dominant features
 - (C) Increase the number of trainable parameters
 - (D) Normalise the input data before convolution
48. Which of the following describes 'overfitting' in a machine learning model?
- (A) The model performs poorly on both training and test data
 - (B) The model generalises well to unseen data
 - (C) The model has too few parameters to capture the underlying pattern
 - (D) The model performs well on training data but poorly on unseen test data

49. Consider an undirected graph G with n vertices that is both connected and acyclic. Which of the following statements is necessarily true?
- (A) G has exactly $n-1$ edges and is a tree
 - (B) G has exactly n edges
 - (C) G has exactly $n+1$ edges
 - (D) G has at least $2n$ edges
50. In a multi-threaded environment, which of the following mechanisms is specifically designed to allow exactly one thread to execute a critical section at a time while permitting other threads to proceed with non-critical work?
- (A) Busy-waiting spinlock with backoff
 - (B) Mutex (mutual exclusion lock)
 - (C) Read-write lock allowing multiple concurrent readers
 - (D) Condition variable without an associated mutex

Part B (Descriptive Questions)

Answer all four questions: 20 Marks

Research Methodology

1. Discuss the After-Only with Control Group Design as an informal experimental design. How does it differ from the before-and-after design?
2. A random sample of 400 voters shows that 240 voters support a particular candidate.
 - a) Estimate the population proportion.
 - b) Construct a 95% confidence interval. (The z -score for a 95% confidence interval is 1.96)

Computer Science

3. Explain the "Memory Hierarchy" in a computer system. Discuss the principles of "Spatial Locality" and "Temporal Locality" and how they influence cache design.
4. What is "Database Normalization"? Explain 1NF, 2NF, and 3NF with the help of a relevant example from a Student Management System.

Rough Work

Rough Work