The ICFAI University, Dehradun
Ph.D. Entrance Examination, 2023
IUDRET-2023
Question Booklet

Computer Science & Engineering   ~ **148915**

Signature and Name of Invigilator

1. (Signature) _____
   (Name) _____
2. (Signature) _____
   (Name) _____

OMR Sheet No.: ....
(To be filled by the Candidate)

Application No. [ ][ ][ ][ ][ ][ ]
(To be filled by the Candidate)

[Time: 2 Hours]
Number of Pages in this Booklet: **08**

[Maximum Marks: **50**]
Number of Questions in this Booklet: **50**

General Instructions: -

1. Write your application number in the space provided at the top of this page.
2. This question booklet consists of fifty multiple-choice types of questions.
3. At the commencement of the examination, the question booklet will be given to you. In the first 5 minutes, you are required to open the question booklet and compulsorily examine it as below:

   (i) To have access to the question booklet, tear off the paper seal on the edge of this cover page. Do not accept a question booklet without a sticker seal and do not accept an open question booklet.

   (ii) Tally the number of pages and a number of questions in the booklet with the information printed on the cover page. A faulty question booklet due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be replaced immediately by a correct booklet from the invigilators within 5 minutes. Afterward, neither the question booklet will be replaced nor any extra time will be given.

   (iii) After this verification is over, the OMR Sheet Number should be entered into this question booklet.

4. Each item has four alternative responses marked (A), (B), (C), and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example: Ⓐ Ⓑ ● Ⓓ   where (C) is the correct response.

5. Your responses to the items are to be indicated in the **OMR Sheet.** It will not be evaluated if you mark at any place other than in the circle in the OMR Sheet.

6. Rough Work is to be done in the space provided in the question booklet.

7. You have to return the question booklet and Original OMR Sheet to the invigilators at the end of the examination compulsorily and must not carry them with you outside the Examination Hall. You are, however, allowed to carry a duplicate copy of the OMR Sheet at the conclusion of the examination.

8. Use only Blue/Black Ball point pen.
9. Use of any calculator or log table etc., is prohibited.
10. There are no negative marks for incorrect answers.

Computer Science & Engineering

Note: This question booklet contains **fifty (50)** objective-type questions, each question carrying **one (01)** mark. Attempt **all** the questions.

1. The best quality of a researcher is
    - (A) Curiosity
    - (B) Active Imagination
    - (C) Ability
    - (D) All the above

2. The quality of research is judged by the
    - (A) Relevance of research
    - (B) Methodology adopted in conducting the research
    - (C) Depth of research
    - (D) Experience of the researcher

3. Research journals with a high .... are commonly considered to be more important than those with lower ones
    - (A) Eigen factor
    - (B) h-index
    - (C) Impact factor
    - (D) i10-index

4. 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 the knowledge
    - (D) All the above

5. Which of the following can best be described as a continuous variable?
    - (A) Gender
    - (B) Annual income
    - (C) Blood Group
    - (D) Religion

6. Which of the following figures reflects the highest value of Karl Pearson's coefficient of correlation?
    - (A) +0.22
    - (B) +0.91
    - (C) -0.49
    - (D) -0.92

7. 'Shodhgangotri' is a repository of
    - (A) E-Resources
    - (B) E-theses
    - (C) Indian Research in Progress
    - (D) E-books

8. Sampling frame is a term used for
    - (A) A list of random numbers
    - (B) A list of voters
    - (C) A list of sampling units of population
    - (D) None of the above

9. Match the following:

List – I (Research Type)	List – II (Characteristics)
a. Historical method	1. Past event
b. Survey method	2. Vision
c. Philosophical method	3. Present events
d. Experimental method	4. Future Action

Codes:

	a	b	c	d
(A)	1	3	2	4
(B)	1	2	3	4
(C)	1	4	2	3
(D)	2	1	4	3

10. Research hypotheses are

(A) A review of current research

(B) Statements of predicted relationships between variables.

(C) Stated such that they can be confirmed or refuted

(D) Both (b) and (c)

11. Which one is known as non-probability sampling?

(A) Cluster sampling

(B) Quota sampling

(C) Systematic sampling

(D) Stratified random sampling

12. The institution promoted by the Department of IT to provide communication infrastructure and services to academic research institutions in India is

(A) INFLIBNET

(B) UGC

(C) ERNET

(D) None of the above

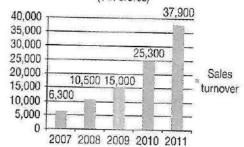13. Fill in the missing number in the following arrangement based on some principle

8	6	4
3	?	7
14	16	18

(A) 4

(B) 5

(C) 6

(D) 8

14. If 'EDUCATION' is coded as NOITACUDE, then 'RED FORT' will be coded as.

(A) TROFDER

(B) FORTRED

(C) TROFRED

(D) FORTDER

15. Which of the following type of histogram represents a normal distribution?

(A) Bell-shaped

(B) Cpmb

(C) Skewed

(D) Plateau

Directions: Study the bar graph given below and answer questions 16 to 20.

Online Travel Industry Sales Turnover
(₹ in crores)

16. Which year witnessed the maximum growth in sales turnover in absolute terms?
    (A) 2008
    (B) 2009
    (C) 2010
    (D) 2011

17. Which year witnessed the maximum growth in sales turnover in percentage terms?
    (A) 2008
    (B) 2009
    (C) 2010
    (D) 2011

18. What is the average sales turnover during all the years (in crores)?
    (A) 17000
    (B) 18000
    (C) 19000
    (D) None of the above

19. What is the approximate percentage growth between 2007 and 2011?
    (A) 400
    (B) 500
    (C) 525
    (D) 600

20. How many years witnessed more than average growth?
    (A) 1
    (B) 2
    (C) 3
    (D) None of the above

21. Which data structure is used to represent a hierarchical structure with parent-child relationships?
    (A) Stack
    (B) Queue
    (C) Tree
    (D) Graph

22. Which programming language is considered a low-level language?
    (A) Java
    (B) Python
    (C) C
    (D) JavaScript

23. What is the process of converting high-level programming code to machine code called?
    (A) Compilation
    (B) Interpretation
    (C) Execution
    (D) Debugging

24. Which software development process model is known for its linear and sequential approach?

(A) Agile

(B) Waterfall

(C) Scrum

(D) Spiral

25. Which sorting algorithm has a worst-case time complexity of $O(n^2)$?

(A) QuickSort

(B) MergeSort

(C) BubbleSort

(D) HeapSort

26. In computer networks, which protocol is used to resolve IP addresses to physical MAC addresses?

(A) TCP

(B) IR

(C) ARP

(D) DNS

27. Which database model represents data in a tabular format with rows and columns?

(A) Relational

(B) Hierarchical

(C) Network

(D) Object-oriented

28. Which architecture style involves the client-server model where clients request services from servers?

(A) Peer-to-peer

(B) Distributed

(C) Client-server

(D) Microservices

29. Which data structure follows the Last-In-First-Out (LIFO) principle?

(A) Queue

(B) List

(C) Stack

(D) Heap

30. In object-oriented programming, what does the term "inheritance" refer to?

(A) The ability to create multiple instances of a class

(B) The process of hiding implementation details

(C) The process of creating new classes based on existing ones

(D) None of above

31. Which type of join in SQL returns only the common rows between two tables?

(A) Inner join

(B) Outer join

(C) Left join

(D) Right join

32. Which algorithm is used to find the shortest path in a weighted graph?

(A) Depth-First Search (DFS)

(B) Breadth-First Search (BFS)

(C) Dijkstra's algorithm

(D) Bellman-Ford algorithm

33. Which layer of the OSI model is responsible for routing and logical addressing?

    (A) Physical layer
    (B) Data link layer
    (C) Network layer
    (D) Transport layer

34. Which data structure is used to implement a hash table?

    (A) Array
    (B) Linked list
    (C) Tree
    (D) Hash map

35. Which programming language is primarily used for web development and is known for its simplicity and readability?

    (A) Java
    (B) Python
    (C) C++
    (D) JavaScript

36. Which software development methodology focuses on continuous integration and delivery?

    (A) Agile
    (B) Waterfall
    (C) Scrum
    (D) DevOps

37. Which sorting algorithm is based on the divide-and-conquer strategy?

    (A) QuickSort
    (B) MergeSort
    (C) BubbleSort
    (D) InsertionSort

38. Which data structure allows efficient insertion and deletion at both ends?

    (A) Stack
    (B) Queue
    (C) Deque
    (D) Linked list

39. In object-oriented programming, what does the term "polymorphism" refer to?

    (A) The ability to create multiple instances of a class
    (B) The process of hiding implementation details
    (C) The process of creating new classes based on existing ones
    (D) The ability of an object to take on many forms

40. Which algorithm is used to find the minimum spanning tree in a graph?

    (A) Depth-First Search (DFS)
    (B) Breadth-First Search (BFS)
    (C) Dijkstra's algorithm
    (D) Prim's algorithm

41. Which design pattern allows objects to be grouped together and treated as a single unit?

    (A) Observer pattern

    (B) Singleton pattern

    (C) Composite pattern

    (D) Builder pattern

42. Which programming language is used for developing Android applications?

    (A) Java

    (B) Python

    (C) C++

    (D) C#

43. Which programming language is commonly used for statistical analysis and data manipulation?

    (A) Java

    (B) Python

    (C) C++

    (D) JavaScript

44. Which software development methodology follows an incremental and iterative approach?

    (A) Agile

    (B) Waterfall

    (C) Scrum

    (D) Lean

45. What does HTTP stand for?

    (A) Hypertext Transfer Protocol

    (B) Hyperlink Text Protocol

    (C) Hyperspeed Transfer Protocol

    (D) High-Tech Transmission Protocol

46. In object-oriented programming, what does the term "encapsulation" refer to?

    (A) The ability to create multiple instances of a class

    (B) The process of hiding implementation details

    (C) The process of creating new classes based on existing ones

    (D) The ability to combine data and functions into a single unit

47. What is the primary purpose of an operating system?

    (A) Execution of application programs

    (B) Managing computer hardware and software resources

    (C) Providing a user interface

    (D) Ensuring data security

48. Which scheduling algorithm provides equal time slices to each?

    (A) Shortest Job First (SJF)

    (B) First-Come, First-Served (FCFS)

    (C) Priority Scheduling

    (D) Round Robin

49. Which number system is commonly used in computer systems?

   (A) Decimal
   (B) Binary
   (C) Octal
   (D) Hexadecimal

50. What is the decimal equivalent of the binary number 1101?

   (A) 4
   (B) 6
   (C) 10
   (D) 13