Paper Code : 2302

Ph. D. (Compter Science & Engg.) Entrance Examination 2023-24   **Time : 2 Hours**

Do not open this Test Booklet until you are asked to do so.   **Maximum Marks : 100**

Immediately fill in the particulars on this page of the Question Booklet and the Answer Sheet with Blue/Black Ball Point Pen. Use of pencil is strictly prohibited.

Name of the candidate (In Capital Letters) :_____

Roll Number (In Figure) : | | | | | | | | | |

(In Words) : _____

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Candidate's Signature :_____   Invigilator's Signature_____

Important Instructions :

This booklet contains 100 objective type questions. First 50 questions of Research Methodology and Second 50 questions of Subject Specific. Each having four options a, b, c, d.

1. Candidates are not allowed to carry textual material printed or written, bits of papers, pages, mobile phone, electronic device or any other material except the Admit Card inside the Examination Hall/Room.

2. The candidates should fill in the required particulars on the Test Booklet and Answer Sheet with Blue/ Black Ball Point Pen.

3. The candidate should not write their Roll Number anywhere else (except in the specified space) on the Test Booklet/Answer Sheet.

4. Out of the four options given for each question, the candidate must mark one correct option as an answer only.

5. There is no negative marking for any wrong answer.

6. Handle the Test Booklet and Answer Sheet with care, as under no circumstances (except for discrepancy in the Test Booklet Code and Answer Sheet Code), will another set be provided.

7. The candidates are not allowed to do any rough work or writing work on the Answer Sheet. All calculations/writing work are to be done in the space available in the Test Booklet itself.

8. Each candidate must show on demand her Admit Card to the Invigilator.

9. No candidate, without special permission of the Superintendent or Invigilator, should leave her seat.

10. The candidate should not leave the Examination Hall without handing over their Answer Sheet and Test Booklet to the invigilator on the duty and signing the Attendance Sheet.

11. No part of the Test Booklet and Answer Sheet shall be detached under circumstances.

NOTE : THIS BOOKLET SHALL BE RETAINED FOR SIX MONTH ONLY.

RESEARCH METHODOLOGY

1. What is the name of the conceptual framework in which the research is carried out ?

   (a) Research hypothesis   (b) Synopsis of research

   (c) Research paradigm   (d) Research design

2. What is the major attribute of Correlation Analysis ?

   (a) Association among variables

   (b) Difference among variables

   (c) Regression among variables

   (d) Variations among variables

3. Which of the following features are considered as critical in qualitative research ?

   (a) Collecting data with the help of standardized research tools.

   (b) Design sampling with probability sample techniques.

   (c) Collecting data with bottom-up empirical evidence.

   (d) Gathering data with top-down schematic evidence.

4. How is random sampling helpful ?

   (a) Reasonably accurate

   (b) An economical method of data collection

   (c) Free from personal biases

   (d) All of the above

5. A research intends to explore the result of possible factors for the organization of effective mid-day meal interventions. Which research method will be most appropriate for this study ?

(a) Descriptive survey method

(b) Historical method

(c) Ex-post facto method

(d) Experimental method

6. In order to pursue the research, which of the following is priorly required?

(a) Developing a research design

(b) Formulating a research question

(c) Deciding about the data analysis procedure

(d) Formulating a research hypothesis

7. The format of thesis writing is the same as in :

(a) Writing of Seminar representation

(b) Preparation of research paper/article

(c) A research dissertation

(d) Presenting a workshop/conference paper

8. Which one among the following statements is false in the context of participatory research ?

(a) It recognizes knowledge as power

(b) It is a collective process of inquiry

(c) It emphasizes people as experts

(d) Its sole purpose is the production of knowledge

9. Which one among the following statements is *true* in the context of the testing of hypotheses ?

 (a) It is only the alternative hypotheses that can be tested.

 (b) It is only the null hypotheses that can be tested.

 (c) Both the alternative and the null hypotheses can be tested.

 (d) Both the alternative and the null hypotheses cannot be tested.

10. Research and Development become the index of development of the country. Which of the following reasons are true with regards to this statement?

 (a) R&D targets human development

 (b) R&D can enhance people's standard of living in the country

 (c) R&D reflects the actual economic and social conditions being prevailed in the country

 (d) All of the above

11. What does the longitudinal research approach actually deal with ?

 (a) Long-term research

 (b) Short-term research

 (c) Horizontal research

 (d) None of the above

12. What do you understand by the term "Anusandhan" ?

 (a) Goal-oriented

 (b) Following an aim

 (c) Attaining an aim

 (d) Praying to achieve an aim

13. Which of the following does not correspond to characteristics of research?

   (a) Research is not passive

   (b) Research is systematic

   (c) Research is not problem-oriented

   (d) Research is not a process

14. Which of the following options are the main tasks of research in modern society ?

   (a) To learn new things

   (b) To keep pace with the advancement in knowledge

   (c) To systematically examine and critically analyze the investigations/ sources with the objective

   (d) All of the above

15. What is the main aim of interdisciplinary research ?

   (a) To oversimplify the problem of research

   (b) To bring out the holistic approach to research

   (c) To create a new trend in research methodology

   (d) To reduce the emphasis on a single subject in the research domain

16. The main aim of the scientific method in the research field is to :

   (a) Improve data interpretation

   (b) Confirm triangulation

   (c) Eliminate spurious research

   (d) Introduce new variables

17. A researcher is interested in studying the prospects of a particular political party in an urban area. So, what tool should he prefer for the study ?

(a) Rating Scale 　　　　　(b) Questionnaire

(c) Interview 　　　　　(d) Schedule

18. The conclusions/findings of which type of research cannot be generalized to other situations ?

(a) Casual Comparative Research

(b) Historical Research

(c) Descriptive Research

(d) Experimental Research

19. How to judge the depth of any research ?

(a) By research title

(b) By research duration

(c) By research objectives

(d) By total expenditure on research

20. Who can successfully conduct Research ?

(a) Someone who is a hard worker

(b) Someone who possesses post-graduation degree

(c) Someone who has studied research methodology

(d) Someone who possesses thinking and reasoning ability

21. Which of the following is *not* the method of Research ?

(a) Survey   (b) Historical

(c) Observation   (d) Philosophical

22. A research problem is feasible only when :

(a) It has utility and relevance

(b) It is new and adds something to knowledge

(c) It is researchable

(d) All of the above

23. Circle graphs are used to show :

(a) How is one part related to other parts ?

(b) How are various sections share in the whole ?

(c) How is one whole related to another whole ?

(d) How are various parts related to the whole ?

24. Authenticity of a research finding is its :

(a) Validity   (b) Objectivity

(c) Originality   (d) All of these

25. Which one is called non-probability sampling ?

(a) Quota sampling   (b) Cluster sampling

(c) Systematic sampling   (d) Stratified random sampling

26. What does a good thesis involve ?

(A) Reducing punctuations as well as grammatical errors to minimalist

(B) Correct reference citations

(C) Consistency in the way of thesis writing

(D) Well defined abstract

Select the answers from the codes given below :

(a) (B), (C) and (D)

(b) (A), (B), (C) and (D)

(c) (A), (B) and (C)

(d) (A), (B) and (D)

27. On what basis did Jean Piaget give his theory of cognitive development of humans ?

(a) Evaluation Research   (b) Fundamental Research

(c) Applied Research   (d) Action Research

28. What are the core elements of a dissertation ?

(a) Introduction; Data Collection; Data Analysis; Conclusions and Recommendations

(b) Executive Summary; Literature Review; Data Gathered; Conclusions; Bibliography

(c) Research Plan; Research Data; Analysis; References

(d) Introduction; Literature Review; Research Methodology; Results; Discussions and Conclusions

29. "Sampling Cases" can be defined as :

(a) Sampling using a sampling frame

(b) Identifying people who are suitable for research

(c) Literally the researcher's brief case

(d) A sampling of people, newspapers, television programs etc.

30. Which technique is generally followed when the population is finite ?

(a) Systematic Sampling Technique

(b) Purposive Sampling Technique

(c) Area Sampling Technique

(d) None of the above

31. Research problem is selected from the standpoint of :

(a) Social relevance

(b) Financial support

(c) Researcher's interest

(d) Availability of relevant literature

32. Which one among the following is the most comprehensive source of population data ?

(a) Census

(b) National Sample Surveys

(c) Demographic Health Surveys

(d) National Family Health Surveys

33. The process not needed in experimental research is :

(a) Controlling

(b) Observation

(c) Reference collection

(d) Manipulation and replication

34. What are those conditions where a research problem is *not* viable ?

(a) It is new and adds something to knowledge

(b) It can be researched

(c) It has utility and relevance

(d) It contains dependent and independent variables

35. How can we enhance the research objective ?

(a) By making it more valid

(b) By making it more reliable

(c) By making it more impartial

(d) All of the above

36. Action-research can be understood as :

(a) A longitudinal research

(b) An applied research

(c) A kind of research being carried out to solve a specific problem

(d) All of the above

37. On what basis can one formulate the assumptions ?

(a) The cultural background of the country

(b) Universities

(c) Some specific characteristics of castes

(d) All of the above

38. Which one among the following falls under the category of research development ?

(a) Descriptive Research (b) Philosophical Research

(c) Action Research (d) All of these

39. What is the use of Factorial Analysis ?

(a) For setting the hypotheses

(b) To understand the difference between two variables

(c) To understand the relationship between two variables

(d) To understand the difference between various variables

40. What is the best-suited name for a process that doesn't necessitate experimental research ?

(a) Manipulation (b) Controlling

(c) Content analysis (d) Observation

41. Which one among the following variables cannot be expressed in quantitative terms ?

(a) Numerical Aptitude (b) Marital Status

(c) Socio-economic Status (d) Professional Attitude

42. The "Sociogram" technique is used to study :

(a) Vocational Interest

(b) Human Relations

(c) Professional Competence

(d) Achievement Motivation

43. Which one among the following phrases does not correspond to the meaning of research as a process ?

(a) Problem Solving   (b) Trial and Error

(c) Objective Observation   (d) Systematic Activity

44. Research can be classified as :

(a) Basic, Applied and Action Research

(b) Quantitative and Qualitative Research

(c) Philosophical, Historical, Survey and Experimental Research

(d) All of the above

45. The first step of research is :

(a) Selecting a problem   (b) Searching a problem

(c) Finding a problem   (d) Identifying a problem

46. 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 the above

47. 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 of the above

48. Fundamental research reflects the ability to :

(a) Synthesize new ideals

(b) Expound new principles

(c) Evaluate the existing material concerning research

(d) Study the existing literature regarding various topics

49. The experimental study is based on :

(a) The manipulation of variables

(b) Conceptual parameters

(c) Replication of research

(d) Survey of literature

50. The main characteristic of scientific research is :

(a) empirical   (b) theoretical

(c) experimental   (d) All of these

51. Given below is the propositional logic :

P : The population of Hyderabad is more than Delhi.

Q : Last year, the number of months with 31 days was 7.

Choose the correct option based on the true value of the statements.

(a) P → Q

(b) (P → Q) → Q

(c) Q → (P → Q) is false

(d) ~ (P → Q) is true

52. Let p, q, r, s represent the following propositions :

p : {8, 9, 10, 11, 12}

q : x is a composite number

r : x is a perfect square

s : x is a prime number

The integer $x \geq 2$ which satisfies $\neg\left(\left(p \Rightarrow q\right) \wedge \left(\neg r \vee \neg s\right)\right)$ is :

(a) 8

(b) 9

(c) 11

(d) 12

53. A $n \times n$ matrix has :

(a) at most n distinct eigenvalues

(b) at least n distinct eigenvalues

(c) exactly n distinct eigenvalues

(d) exactly $n + 1$ distinct eigenvalues

54. $\int_{0}^{1} (2x+1)$ is :

(a) 1   (b) 2

(c) 3   (d) 4

55. The probability of drawing an ace card from a deck of cards is :

(a) 1/52   (b) 1/26

(c) 4/13   (d) 1/1

56. What is the minimum number of gates required to implement the Boolean function (AB + C) if we have to use only 2-input NOR gates ?

(a) 2   (b) 3

(c) 4   (d) 5

57. How many pulses are needed to change the contents of a 8-bit up counter from 10101100 to 00100111 (rightmost bit is the LSB) ?
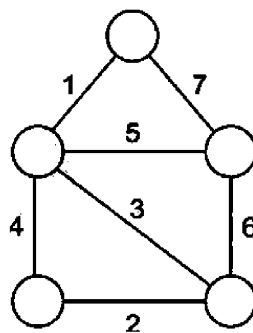
(a) 134   (b) 133

(c) 124   (d) 123

58. Let A = 11111010 and B = 00001010 be two 8-bit 2's complement numbers. Their product in 2's complement is :

(a) 1100 0100   (b) 1001 1100

(c) 1010 0101   (d) 1101 0101

59. A latch is constructed using two cross-coupled :

(a) AND and OR gates (b) AND gates

(c) NAND and NOR gates (d) NAND gates

60. The IEEE-754 double-precision format to represent floating point number, has a length of :

(a) 16 (b) 32

(c) 48 (d) 64

61. A dynamic RAM has refresh cycle of 32 times per msec. Each refresh operation requires 100 nsec and a memory cycle requires 250 nsec. What percentage of memory's total operating time is required for refreshes ?

(a) 0.64 (b) 0.96

(c) 2.00 (d) 0.32

62. Which of the following is *incorrect* for virtual memory ?

(a) Large programs can be written

(b) More I/O is required

(c) More addressable memory available

(d) Faster and easy swapping of process

63. Serial access memories are useful in applications where :

(a) Data consists of numbers

(b) Short access time is required

(c) Each stored word if processed differently

(d) None of the above

64. The instruction : MOV CL, [BX][DI] + 8 represents the............ addressing mode.

(a) Based Relative   (b) Based Indexed

(c) Indexed Relative   (d) Register Indexed

65. Which of the following is a design criteria for instruction formats ?

(a) The size of instructions.

(b) The number of bits in the address fields.

(c) The sufficient space in the instruction format to express all the operations desired.

(d) All of the above

66. A vertex of in-degree zero in a directed graph is called a/an :

(a) Root vertex   (b) Isolated vertex

(c) Sink   (d) Articulation point

67. For getting best time complexity in the worst case scenario, which sorting algorithm is used ?

(a) Bubble sort   (b) Selection sort

(c) Quick sort   (d) Merge sort

68. Consider the array A = 4, 1, 3, 2, 16, 9, 10, 14, 8, 7. After building the heap from the array A, calculate the depth of heap.

(a) 3   (b) 4

(c) 2   (d) 5

69. To perform level-order traversal on a binary tree, which of the following data structure will be required ?

(a) Hash table   (b) Queue

(c) Binary search tree   (d) Stack

70. Which of the following is *not* the application of stack ?

(a) Data transfer between two asynchronous processes

(b) Compiler syntax analyser

(c) Tracking of local variables at run time

(d) A parentheses balancing program

71. Which is the most appropriate data structure for reverse the string ?

(a) Queue   (b) Stack

(c) Tree   (d) Graph

72. What is the minimum cost spanning tree of the following graph ?

(a) 13   (b) 16

(c) 11   (d) 10

73. If several elements are competing for the same bucket in the hash table, what is it called ?

(a) Diffusion   (b) Replication

(c) Collision   (d) Duplication

74. If a problem can be broken into subproblems which are reused several times, the problem possesses....................property.

(a) Overlapping subproblems   (b) Optimal substructure

(c) Greedy   (d) Memorization

75. The maximum number of comparisons needed to sort 9 items using radix sort is (assume each item is 5-digit octal number) :

(a) 360   (b) 45

(c) 72   (d) 450

76. A pushdown automata behaves like a Turing machine when the number of auxiliary memory is :

(a) 0   (b) 1

(c) 1 or more   (d) 2 or more

77. To obtain a string of n terminals from a given Chomsky Normal Form grammar, the number of productions to be used is :

(a) $2n - 1$ (b) $2n$

(c) $n + 1$ (d) n^2

78. Context sensitive languages can be recognized by a :

(a) Finite state machine

(b) Deterministic finite automata

(c) Non-deterministic finite automata

(d) Linear bounded automata

79. Synthesized attribute can be easily simulated by a/an :

(a) LL grammar

(b) Ambiguous grammar

(c) LR grammar

(d) None of the above

80. The most general phase of structured grammar is :

(a) Context-sensitive grammar

(b) Context-free grammar

(c) Regular grammar

(d) All of the above

81. A bottom-up parser generates :

(a) Leftmost derivation in reverse

(b) Rightmost derivation in reverse

(c) Leftmost derivation

(d) Rightmost derivation

82. How many tokens will be generated by the scanner for the following statement ?

$$x = x * (a + b) - 5;$$

(a) 12 (b) 11

(c) 10 (d) 07

83. The grammar S –> (S) | SS | € is *not* suitable for predictive parsing because the grammar is :

(a) Left recursive (b) Ambiguous

(c) Right recursive (d) Operator grammar

84. Shift reduce parser consists of :

I. Input buffer

II. Stack

III. Parse table

Choose the correct option from those given below :

(a) I and II only (b) I and III only

(c) II only (d) I, II and III

85. The number of bit strings of length eight that will either start with a 1 bit or end with two bits 00 shall be :

(a) 32 (b) 64

(c) 128 (d) 160

86. Which of the following is a top-down approach in which the entity's higher level can be divided into two lower sub-entities ?

(a) Aggregation   (b) Generalization

(c) Specialization   (d) All of these

87. Which one of the following commands is used to modify a column inside a table ?

(a) Drop   (b) Alter

(c) Update   (d) Set

88. Which of the following is *correct* ?

I. 2-Phase locking is an optimistic protocol

II. 2-Phase locking is a pessimistic protocol

III. Time stamping is an optimistic protocol.

IV. Time stamping is a pessimistic protocol.

(a) I and III   (b) II and IV

(c) I and IV   (d) II and III

89. Data which improves the performance and accessibility of database is called :

(a) Indexes

(b) User Data

(c) Application metadata

(d) Data Dictionary

90. A Relation R = {A, B, C, D, E, F, and G} is given with the following set of functional dependencies :

F = {AD –> E, BE –> F, B –> C, AF –> G}

Which of the following is a Candidate key ?

(a) A

(b) AB

(c) ABC

(d) ABD

91. The IP network 192.168.50.0 is to be divided into 10 equal sized subnets. Which of the following subnet masks can be used for the above requirement?

(a) 255.243.240

(b) 255.255.0.0

(c) 255.255.255.0

(d) 255.255.0

92. Which one of the following is a cryptographic protocol used to secure HTTP connection ?

(a) Stream Control Transmission Protocol (SCTP)

(b) Transport Layer Security (TLS)

(c) Explicit Congestion Notification (ECN)

(d) Resource Reservation Protocol (RRP)

93. A client of the DNS (Domain Name System) application is called :

(a) DNS server

(b) DNS Name

(c) DNS resolver

(d) DNS inquirer

94. Which one of the following is *not* a function of network layer ?

(a) Congestion control

(b) Error control

(c) Routing

(d) Inter-networking

95. Which of the following cannot be used as a medium for 802.3 Ethernet ?

(a) Thin coaxial cable

(b) Microwave link

(c) Twisted pair cable

(d) Fiber optical cable

96. A deadlock avoidance algorithm dynamically examines the...........to ensure that a circular wait condition can never exist.

(a) resource allocation state

(b) system storage state

(c) operating system

(d) resource

97. Consider the following disk request sequence for a disk with 100 tracks : 45, 21, 67, 90, 4, 89, 52, 61, 87, 25. Head pointer starting at 50. Find the number of head movements in cylinders using SSTF scheduling.

(a) 376

(b) 136

(c) 209

(d) 137

98. In round robin CPU scheduling as time quantum is increased the average turnaround time :

(a) increases   (b) decreases

(c) remains constant   (d) varies irregularly

99. Consider a paging hardware with a TLB. Assume that the entire page table and all the pages are in the physical memory. It takes 10 milliseconds to search the TLB and 80 milliseconds to access the physical memory. If the TLB hit ratio is 0.6, the effective memory access time (in milliseconds) is :

(a) 120   (b) 124

(c) 122   (d) 118

100. Consider a main memory with five page frames and the following sequence of page references :

3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. Which one of the following is true with respect to page replacement policies First-In-First-out (FIFO) and Least Recently Used (LRU)?

(a) Both incur the same number of page faults

(b) FIFO incurs 2 more page faults than LRU

(c) LRU incurs 2 more page faults than FIFO

(d) FIFO incurs 1 more page faults than LRU