Entrance Exam

2024



QUESTION PAPER

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M.Voc PROGRAMME IN SOFTWARE APPLICATION DEVELOPMENT

1. What is the definition of continuity for a function of two variables at a point (a, b)?

   (A) $\lim_{(x,y)\to(a,b)} f(x, y) = f(a,b)$

   (B) $a \lim_{(x,y)\to(a,b)} f(x, y) = 0$

   (C) $f(a,b) = 0$

   (D) $f(x, y) = f(a,b)$

2. What does the partial derivative of a function with respect to x represent?

   (A) Rate of change of the function with respect to y
   (B) Rate of change of the function with respect to x
   (C) Total derivative of the function
   (D) Slope of the tangent line to the graph

3. When evaluating a triple integral, what does the differential element '$dz\ dy\ dx$' represent?

   (A) Volume element
   (B) Surface area element
   (C) Length element
   (D) Area element

4. If a vector field has zero curl, what can be said about its circulation around a closed curve?

   (A) Circulation is zero
   (B) Circulation is non-zero
   (C) Circulation is negative
   (D) Circulation is infinite

5. Locate the critical points of the function $f(x, y) = x_2 + 2bxy + y_2$ and classify them as relative minimum, relative maximum, and saddle points.

   (A) $b_2 < 1, b_2 > 1, b = -1$
   (B) $2b < 1, b_2 > 1, b = -1$
   (C) $b < 1, 2b > 1, b = 1$
   (D) $b = 1, b = 0, b < 1$

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6. Let T be a transformation defined by

$$T\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} x+y \\ x-z \end{bmatrix} \text{ for all } \begin{bmatrix} x \\ y \\ z \end{bmatrix} \in \mathbb{R}^3$$

$T : R3 \rightarrow R2$ is defined by $\in \mathbb{R}^3$ evaluate T.

(A) Non-Linear transformation
(B) Linear transformation
(C) Rotation
(D) Scaling

7. When A is squared, eigenvectors ……., eigenvalues…….

(A) are squared, remains same
(B) both are squared
(C) remains same, are squared
(D) both remains same

8. Suppose $A = uv^T$ where u and v are non-zero column vectors in $\mathbb{R}^n$, $n \geq 3$, $\lambda = 0$ is an eigenvalue of A, since A is not of full rank. $\lambda = v^T u$ is also an eigenvalue of A since $Au = \left(uv^T\right)u = u\left(v^T u\right) = \left(v^T u\right)u$. Can A be diagonalizable?

(A) A is diagonalizable if and only if A is the zero matrix
(B) A is diagonalizable if and only if u is not orthogonal to v
(C) A is diagonalizable if $v^T u \neq 0$
(D) A is diagonalizable if $v^T u \neq 0$ and u is not orthogonal to v

9. Let $v_1 = (1, 1, 0)$ and $v_2 = (2, 1, 1)$ in $\mathbb{R}^3$, what can you say about v_1 and v_2 ?

(A) $v_1 = v_2$
(B) v_1, v_2 are linearly dependent
(C) v_1, v_2 are linearly independent
(D) $v_1, v_2 = 0$

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10. Let U and V be vector spaces with dimensions m and n, respectively. If there exists a linear transformation T: $U \rightarrow V$, and $m > n$, what can be said about the transformation?

(A) T is surjective (onto)
(B) T is injective (one-to-one)
(C) T cannot exist
(D) T is an isomorphism

11. In a finite-dimensional inner product space, which of the following is true?

(A) Every subspace is also an inner product space
(B) Orthogonal vectors in the space are always linearly independent
(C) The dimension of the space is always prime
(D) Every linearly independent set in the space can be extended to form a basis

12. Which of the following statements about metric spaces is true?

(A) Every closed subset of a compact set is compact
(B) The intersection of two compact sets is always compact
(C) Every metric space is complete
(D) A continuous image of a compact set is always compact

13. Which of the following statements about an analytic function is true?

(A) Analytic functions are always continuous
(B) Analytic functions are always differentiable
(C) Analytic functions are always harmonic
(D) Analytic functions can have isolated singularities

14. Which statement about Laurent series is correct?

(A) Laurent series converges uniformly inside its annular region
(B) Laurent series has a finite radius of convergence
(C) Laurent series converges uniformly on its boundary
(D) Laurent series can only represent analytic functions

15. The function contains the expression $x^2 + y^2$, when it equals zero, and obtains circles of increasing radius will forms a

(A) Circle
(B) Paraboloid
(C) Cone
(D) Level of Curves

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16. Determine which of the following subsets of $\mathbb{R}^2$ are neither open nor close

1. $A = \{(x, y) \in \mathbb{R}^2 : x + y = 1\}$
2. $A = \{(x, y) \in \mathbb{R}^2 : x + y > 1\}$
3. $A = \{(x, y) \in \mathbb{R}^2 : x, y \in \mathbb{Q}\}$
4. $\mathbb{R}^2 / \{1, -1\}$

(A) 1
(B) 2
(C) 3
(D) 4

17. Which of the following statements is true about first-order ordinary differential equations (ODEs)?

(A) Every first-order ODE has a unique solution for any initial value
(B) First-order ODEs always have a closed-form solution
(C) The solution to a first-order ODE depends only on the initial condition
(D) First-order ODEs can only be solved numerically

18. In a cyclic group, which of the following statements is true?

(A) Every cyclic group is finite
(B) Every cyclic group is isomorphic to the additive group of integers
(C) Cyclic groups do not have subgroups
(D) A cyclic group always has a normal subgroup

19. Consider a ring R and an ideal I of R. Which of the following statements is true?

(A) Every ring is an ideal
(B) Every ideal is a ring
(C) The quotient ring R/I is always a field
(D) The quotient ring R/I is always a ring

20. Diagonalize the quadratic form $Q(x, y) = 2x^2 - 4xy - y^2$. Use the result to describe the shape of $Q(x, y) = 1$ in $\mathbb{R}^2$.

(A) Cone
(B) Hyperbola
(C) Hyperboloid
(D) Cuboid

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21. Let $a_n = (n+1)^{100}$ for $n \geq 1$, then the sequence is $e\sqrt{n}$ for $n \geq 1$. Then the sequence of $(a_n)_n$ is

(A) unbounded
(B) unbounded but does not convergence
(C) bounded and convergence to 0
(D) bounded and convergence to1

22. Consider the linear system $Mx = b$, where

$$M = \begin{bmatrix} 2 & -1 \\ -4 & 3 \end{bmatrix} \text{ and } b = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$$

Suppose $M = LU$, where L and U are lower triangular and upper triangular square matrices, respectively. Consider the following statements:

P: If each element of the main diagonal of L is 1, then trace $(U) = 3$
Q: For any choice of the initial vector $x^{(0)}$, the Jacobi iterates x^k, $k = 1,2,3,\ldots$, converge to the unique solution of the linear system $Mx = b$.

(A) Both *P* and *Q* are True
(B) *P* is False and *Q* is True
(C) *P* is True and *Q* is False
(D) Both *P* and *Q* are False

23. Find the circle of convergence for the power series

$$\sum_{k=1}^{\infty} \left(1 + \frac{1}{k}\right)^{k^2} z^k$$

(A) $\frac{1}{2e}$
(B) $\frac{1}{e}$
(C) $2e$
(D) e

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24. Find the solution of y, if $y' = 2t(25 - y)$.

(A) $25 + Ae^{-t^2}$

(B) $27 + Ae^{t^2}$

(C) $25 + Ae^{t^2}$

(D) $27 + Ae^{-t^2}$

25. If $0 < p < 1$ which one of the following has a least value?

(A) $\frac{1}{P^2}$

(B) $\frac{1}{(P+1)^2}$

(C) $\frac{1}{P\sqrt{2}}$

(D) $\frac{1}{1+P^2}$

26. In Cholesky factorization, a symmetric matrix A is decomposed into the product of a lower triangular matrix (L) and its transpose (L^T). What is a key requirement for applying Cholesky factorization?

(A) Matrix A must be positive definite
(B) Matrix A must be sparse
(C) Matrix A must be singular
(D) Matrix A must be symmetric but not necessarily positive definite

27. Which method is used to handle degeneracy in the simplex method?

(A) Two-phase method
(B) Revised simplex method
(C) Hungarian method
(D) Vogel's approximation method

28. Which method is used to solve the assignment problem efficiently?

(A) Vogel's approximation method
(B) Hungarian method
(C) Least cost method
(D) North-west corner rule

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29. If two six-sided dice are rolled, what is the probability that the sum of the numbers is 7?

(A) $\frac{1}{6}$

(B) $\frac{1}{12}$

(C) $\frac{1}{9}$

(D) $\frac{1}{8}$

30. What does the correlation coefficient measure in a linear regression analysis?

(A) Strength of the relationship
(B) Direction of the relationship
(C) Both strength and direction of the relationship
(D) Magnitude of the residuals

31. Which logic gate is used to implement binary addition in a computer?

(A) NOT gate
(B) OR gate
(C) XOR gate
(D) NAND gate

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32. In the following truth table, $V = 1$ if and only if the input is valid.

Inputs				Outputs		
D_0	D_1	D_2	D_3	X_0	X_1	V
0	0	0	0	x	x	0
1	0	0	0	0	0	1
x	1	0	0	0	1	1
x	x	1	0	1	0	1
x	x	x	1	1	1	1

What function does the truth table represent?

(A) Priority Encoder
(B) Decoder
(C) Multiplexer
(D) Demultiplexer

33. Which of the following is a volatile memory in a computer system?

(A) RAM
(B) ROM
(C) Programmable ROM
(D) Hard disk drive

34. What is the purpose of the instruction register (IR) in a CPU?

(A) Holds only the address of the next instruction to be executed
(B) Holds the address of the next instruction to be executed besides holding the current instruction being executed
(C) Holds only the current instruction being executed
(D) Controls the flow of instructions between registers and RAM

35. What is the role of the system bus in a computer architecture?

(A) Connect the CPU to the main memory
(B) Facilitate communication between different hardware components
(C) Manage input and output operations
(D) Store the operating system

FOR REFERENCE ONLY

36. Which sorting algorithm has the best average-case time complexity?

(A) Bubble Sort
(B) Quick Sort
(C) Selection Sort
(D) Insertion Sort

37. What is the time complexity of searching for an element in a binary search tree (BST) with 'n' nodes in the worst case?

(A) $O(1)$
(B) $O(n)$
(C) $O(\log n)$
(D) $O(n \log n)$

38. In a linked list, which component stores the actual data?

(A) Node
(B) Head
(C) Pointer
(D) Root

39. What is the primary purpose of a queue data structure?

(A) Last In First Out (LIFO) access
(B) First In First Out (FIFO) access
(C) Random access
(D) Hash-based access

40. In a binary heap, what is the relationship between the parent and child nodes' values in a min-heap?

(A) Parent is greater than both children
(B) Parent is less than both children
(C) Parent is greater than one child and less than the other
(D) Parent is equal to the average of the children

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41. Consider the following recursive C++ function that takes two arguments

```
unsigned int foo(unsigned int n, unsigned int r) {
if(n  > 0) return(n%r +  foo (n/r, r ));
     else return0;
}
```

What is the return value of the function foo when it is called foo(345, 10)?

(A) 345
(B) 12
(C) 5
(D) 3

42. Which of the following automata is more powerful in terms of recognition capability?

(A) Finite Automata (FA)
(B) Pushdown Automata (PDA)
(C) Deterministic Finite Automata (DFA)
(D) Non-deterministic Finite Automata (NFA)

43. What is the primary purpose of lexical analysis in compiler design?

(A) Error checking
(B) Syntax tree generation
(C) Tokenization
(D) Optimization

44. Which one of the following statements about normal forms is FALSE?

(A) BCNF is stricter than 3NF
(B) Lossless, dependency-preserving decomposition into 3NF is always possible
(C) Lossless, dependency-preserving decomposition into BCNF is always possible
(D) Any relation with two attributes is in BCNF

45. The lexical analysis for a modern computer language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense?

(A) Finite state automata
(B) Deterministic pushdown automata
(C) Non-Deterministic pushdown automata
(D) Turing Machine

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46. What is the purpose of the 'scheduler' in an operating system?

(A) Allocating memory
(B) Managing file systems
(C) Controlling I/O operations
(D) Managing the execution of processes

47. Which memory management scheme allows the OS to execute processes that are not completely in memory?

(A) Paging
(B) Segmentation
(C) Virtual memory
(D) Cache memory

48. What is the purpose of the 'device driver' in an operating system?

(A) Manage file systems
(B) Interface with peripheral devices
(C) Allocate CPU resources
(D) Schedule processes

49. Which file system is commonly used in Windows operating systems?



(A) Ext4
(B) NTFS
(C) HFS+
(D) FAT32

50. Consider the virtual page reference string 1, 2, 3, 2, 4, 1, 3, 2, 4, 1. On a demand paged virtual memory system running on a computer system that main memory size of 3 pages frames which are initially empty. Let LRU, FIFO and OPTIMAL denote the number of page faults under the corresponding page replacements policy. Then

(A) OPTIMAL < LRU < FIFO
(B) OPTIMAL < FIFO < LRU
(C) OPTIMAL = LRU
(D) OPTIMAL = FIFO

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51. Let the page fault service time be 10 ms in a computer with average memory access time being 20 ns. If one page fault is generated for every 10^6 memory accesses, what is the effective access time for the memory?

(A) 21 ns
(B) 30 ns
(C) 23 ns
(D) 35 ns

52. An 8 KB direct-mapped write-back cache is organized as multiple blocks, each of size 32-bytes. The processor generates 32-bit addresses. The cache controller maintains the tag information for each cache block comprising of the following.

1 Valid bit
1 Modified bit

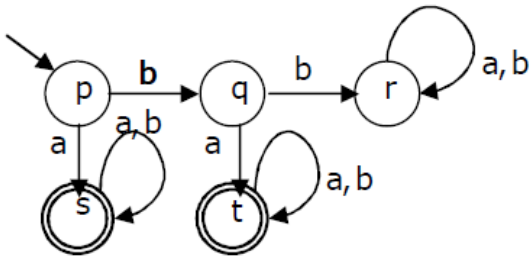
As many bits as the minimum needed to identify the memory block mapped in the cache.

What is the total size of memory needed at the cache controller to store meta-data (tags) for the cache?

(A) 4864 bits
(B) 6144 bits
(C) 6656 bits
(D) 5376 bits

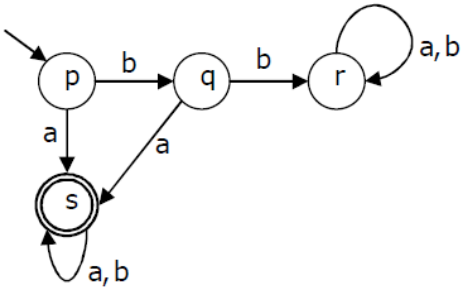
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53. A deterministic finite automation (DFA)D with alphabet $\{a, b\}$ is given below.

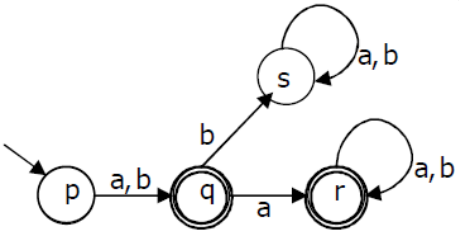


Which of the following finite state machines is a valid minimal DFA which accepts the same language as D?

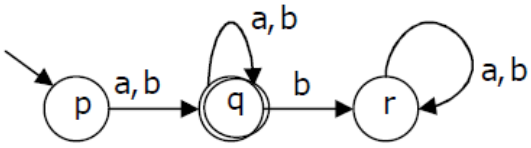
(A)



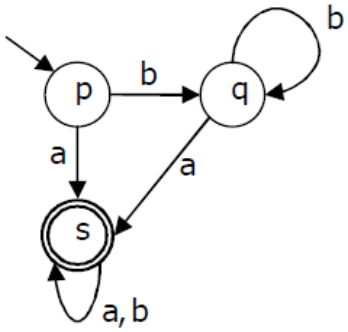
(B)



(C)



(D)



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54. For the processes listed in the following table, which of the following scheduling schemes will give the lowest average turnaround time?

Process	Arrival Time	Processing Time
A	0	3
B	1	6
C	4	4
D	6	2

(A) First Come First Serve
(B) Non-preemptive Shortest Job First
(C) Shortest Remaining Time
(D) Round Robin with Quantum value two

55. In a relational database, what is a foreign key?

(A) A key that is automatically generated
(B) A key that uniquely identifies a record
(C) A key that links two tables by referencing the primary key of another table
(D) A key that is used for sorting records

56. Which normalization form ensures that all non-prime attributes are fully functionally dependent on the primary key?



(A) First Normal Form (1NF)
(B) Second Normal Form (2NF)
(C) Third Normal Form (3NF)
(D) Boyce-Codd Normal Form (BCNF)

57. Which of the following is a type of NoSQL database?

(A) MySQL
(B) MongoDB
(C) Oracle
(D) SQLite

58. Which of the following statements describes the purpose of database indexing?

(A) Organize data in tables
(B) Ensure data consistency
(C) Improve query performance by allowing faster data retrieval
(D) Define relationships between tables

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59. What is the purpose of Transport layer in the OSI model?

(A) Physical data transmission
(B) Routing and addressing
(C) End-to-end communication
(D) Error detection and correction

60. What is the purpose of the DHCP (Dynamic Host Configuration Protocol) in a network?

(A) Assigning static IP addresses
(B) Resolving domain names
(C) Dynamically assigning IP addresses to devices
(D) Establishing secure connections

Direction (Question No. 61 and 62): Read the following paragraph carefully and answer the question below

"The Industrial Revolution marked a significant turning point in human history. It began in the late 18th century and brought about profound changes in society. Innovations in technology, such as the steam engine and spinning jenny, revolutionized manufacturing processes. Factories emerged, leading to the mass production of goods. This period also witnessed urbanization as people moved from rural areas to cities in search of employment. While the Industrial Revolution fueled economic growth, it also gave rise to social and environmental challenges."

61. What is the primary focus of the paragraph?

(A) The impact of the Industrial Revolution on society
(B) The history of rural areas
(C) Innovations in technology
(D) Challenges of economic growth

62. What technological advancements are mentioned in the paragraph?

(A) Printing press and telescope
(B) Steam engine and spinning jenny
(C) Telegraph and automobile
(D) Waterwheel and loom

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Direction (Question No. 63 and 64): Read the following paragraph carefully and answer the question below:

The entrepreneur displayed remarkable sagacity in managing the complexities of the business world. His acumen in decision-making and his ability to foresee market trends set him apart. Despite facing occasional setbacks, his tenacity and resilience propelled him towards success.

63. Which word is a synonym for "sagacity" as used in the paragraph?

(A) Ignorance
(B) Wisdom
(C) Naivety
(D) Ineptitude

64. What is the antonym for "tenacity" based on its usage in the paragraph?

(A) Persistence
(B) Resilience
(C) Fragility
(D) Determination

Direction (Question No. 65 and 66): Read the following paragraph carefully and answer the question below

In the rapidly evolving field of artificial intelligence, ethical considerations play a crucial role. As AI systems become more integrated into various aspects of our lives, questions arise about their impact on privacy, bias, and decision-making. One must carefully assess the algorithms and data sets used in AI development to ensure fairness and transparency. Moreover, the responsibility lies not only with developers but also with policymakers to establish robust regulations that govern the ethical use of AI.

65. What is the primary concern raised in the text regarding artificial intelligence?

(A) Technological advancements in AI
(B) Integration of AI into our lives
(C) Ethical considerations in AI development
(D) Privacy concerns in AI systems

66. Who shares the responsibility for ensuring ethical use of AI, according to the text?

(A) Developers only
(B) Policymakers only
(C) Both developers and policymakers
(D) General public

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67. Fill in the blanks

The phone ……. for the last two minutes.

(A) is ringing
(B) rang
(C) has been ringing
(D) rings

68. Which of the following is in the pattern of subject + verb + object?

(A) Are you working tomorrow?
(B) Is he right here?
(C) He admitted his mistakes.
(D) Getting up early

Direction (Question No. 69 to 71): Read the following paragraph carefully and answer the question below

In the heart of the bustling city, a small bookstore named "Book Haven" stood proudly. The cozy atmosphere and the scent of old books welcomed avid readers. The shelves were filled with a diverse collection of genres, from classic literature to contemporary fiction. The bookstore also hosted weekly book club meetings and author signings, attracting a community of passionate readers.

69. What can be inferred about "Book Haven" from the given paragraph?

(A) It is located in a remote village
(B) The bookstore offers a limited selection of genres
(C) Weekly book club meetings and author signings are held at the bookstore
(D) The bookstore is known for its modern and sleek design

70. What does the description of the bookstore's atmosphere suggest?

(A) The atmosphere is chaotic and noisy
(B) The atmosphere is unwelcoming and sterile
(C) The atmosphere is cozy and inviting
(D) The atmosphere is formal and reserved

FOR REFERENCE ONLY

71. Based on the paragraph, what is likely to be found on the shelves of "Book Haven"?

(A) Only classic literature
(B) A limited collection of books
(C) A diverse collection of genres
(D) Exclusively contemporary fiction

Direction (Question No. 72 to 76): Read the following paragraph carefully and answer the question below

"The human brain, a complex organ weighing about three pounds, is the epicenter of our nervous system and controls various bodily functions. Composed of billions of neurons, the brain is divided into different regions, each responsible for specific functions such as motor control, sensory perception, and higher cognitive processes. The cerebral cortex, the outer layer of the brain, plays a crucial role in functions like language, memory, and problem-solving. Neurons communicate through synapses, allowing electrical and chemical signals to transmit information. Understanding the structure and function of the brain is essential for exploring neurological disorders, developing treatments, and gaining insights into human behavior."

72. What is the main function of the cerebral cortex in the brain?

(A) Motor control
(B) Sensory perception
(C) Language, memory, and problem-solving
(D) Neuron communication

73. What is the role of neurons in the brain?

(A) Outer layer of the brain
(B) Motor control
(C) Synaptic transmission of information
(D) Sensory perception

74. What is the weight of the human brain, approximately?

(A) One pound
(B) Two pounds
(C) Three pounds
(D) Four pounds

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75. Why is understanding the structure and function of the brain essential?

(A) Exploring cardiovascular disorders
(B) Developing treatments for respiratory issues
(C) Gaining insights into human behavior
(D) Understanding muscular functions

76. What is the primary role of synapses in the brain?

(A) Sensory perception
(B) Motor control
(C) Transmitting information through electrical and chemical signals
(D) Language processing

Direction (Question No. 77 to 81): Read the following passage and answer the question below

Organisations are institutions in which members compete for status and power. They compete for resource of the organisation, for example finance to expand their own departments, for career advancement and for power to control the activities of others. In pursuit of these aims, groups are formed and sectional interests emerge. As a result, policy decisions may serve the ends of political and career systems rather than those of the concern. In this way, the goals of the organisation may be displaced in favour of sectional interests and individual ambition. These preoccupations sometimes prevent the emergence of organic systems. Many of the electronic firms in the study had recently created research and development departments employing highly qualified and well paid scientists and technicians. Their high pay and expert knowledge were sometimes seen as a threat to the established order of rank, power and privilege. Many senior managers had little knowledge of technicality and possibilities of new developments and electronics. Some felt that close cooperation with the experts in an organic system would reveal their ignorance and show their experience was now redundant.

77. The theme of the passage is

(A) groupism in organizations
(B) individual ambitions in organizations
(C) frustration of senior managers
(D) emergence of sectional interests in organizations

78. "Organic system" as related to the organization implies its

(A) growth with the help of expert knowledge
(B) growth with input from science and technology
(C) steady all around development
(D) natural and unimpeded growth

79. Policy decision in organization would involve

(A) cooperation at all levels in the organization
(B) modernization of the organization
(C) attracting highly qualified personnel
(D) keeping in view the larger objectives of the organizations

80. The author makes out a case for

(A) organic system
(B) research and development in organizations
(C) an understanding between senior and middle level executives
(D) a refresher course for senior managers

81. The author tends to the senior managers as

(A) ignorant and incompetent
(B) a little out of step with their work environment
(C) jealous of their younger colleagues
(D) robbed of their rank, power and privilege

Direction (Question No. 82 to 86): Read the following passage and answer the question below

The Indian middle class consist of so many strata that it defies categorisation under a single term class, which would imply a considerable degree of homogeneity. Yet two paradoxical features characterise its conduct fairly uniformly; extensive practice and intensive abhorrence of corruption.

In the several recent surveys of popular perceptions of corruptions, politicians of course invariably and understandably top the list, closely followed by bureaucrats, policemen, lawyers, businessmen and others. The quintessential middle class. If teachers do not figure high on this priority list, it is not for lack of trying, but for lack of oppurtunities. Over the years, the sense of shock over acts of corruption in the middle class has witnessed a steady decline, as its ambitions for a better material life have soared but the resources for meeting such ambitions have not kept pace.

What is fascinating, however, is the intense yearning of this class for a clean corruption less politics and society, a yearning that has again and again surfaced with any figure public or obscure, focus on his mission of eradicating corruption. Even the repeated failure of this promise on virtually every man's part has not subjected it to the law of diminishing returns.

82. The intense Middle Class intensely yearns for

(A) better material resources
(B) extensive practice of corruption
(C) clean honest society
(D) law of increasing returns

FOR REFERENCE ONLY

83. Teachers are not high on the list of corruption because they do not have

(A) courage
(B) opportunities
(C) support
(D) ambition

84. The Indian Middle class is

(A) defiant
(B) mysterious
(C) homogeneous
(D) stratified

85. Who figure on top of the list of corruption?

(A) Businessmen
(B) Lawyers
(C) Politicians
(D) Policemen

86. This yearning, over the years, has

(A) persisted
(B) soared
(C) declined
(D) disappeared

87. Choose the synonym for the underlined word.

In spite of their efforts, the team of scientists could not make much **headway** to solve the problem.

(A) progress
(B) thinking
(C) efforts
(D) start

88. Choose the synonym for the underlined word.

The great dancer impressed the appreciative crowd by his **nimble** movements.

(A) unrhythmic
(B) lively
(C) quickening
(D) clear

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89. Choose the synonym for the underlined word.

The **indiscriminate** demand for mass consumption goods is deplorable.

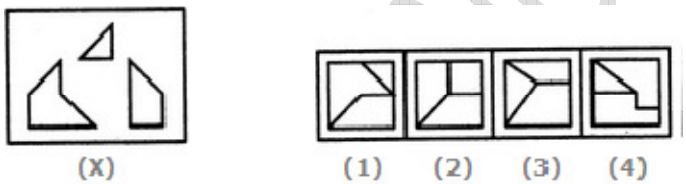
(A) desperate
(B) undifferentiated
(C) discreet
(D) insensitive

90. Choose the synonym for the underlined word.

Being a member of this club, he has certain **rights**.

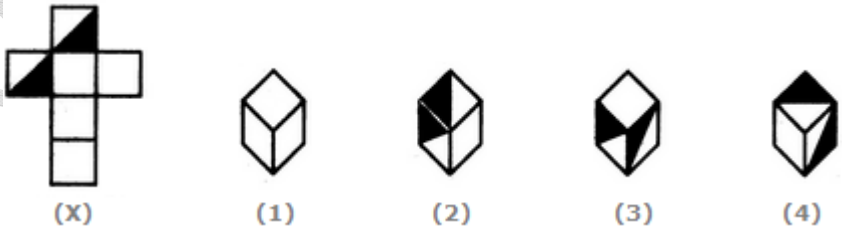
(A) status
(B) truth
(C) virtues
(D) privileges

91. Find out which of the figures (1), (2), (3) and (4) can be formed from the pieces given in figure (X).



(A) (1)
(B) (2)
(C) (3)
(D) (4)

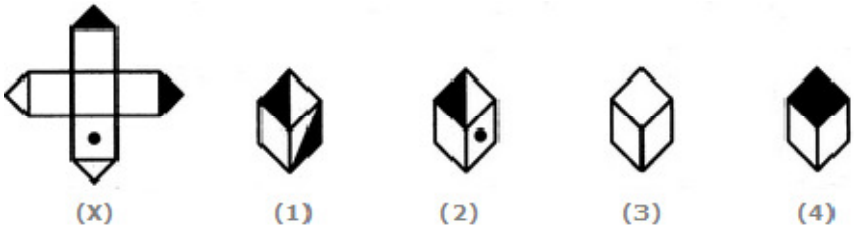
92. Choose the box that is similar to the box formed from the given sheet of paper (X).



(A) (1) and (4) only
(B) (3) and (4) only
(C) (1) and (2) only
(D) (2) and (3) only

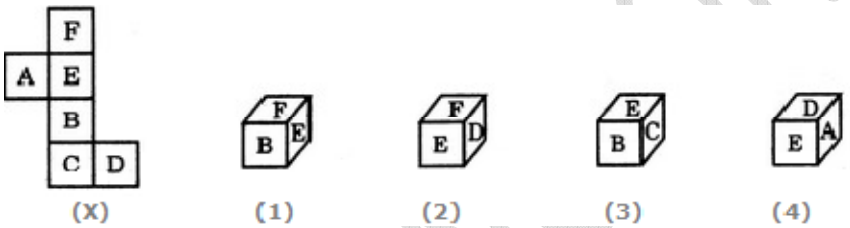
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93. Choose the box that is similar to the box formed from the given sheet of paper (X).



(A) (1) and (2) only
(B) (2) and (4) only
(C) (2) and (3) only
(D) (1) and (4) only

94. Choose the box that is similar to the box formed from the given sheet of paper (X).



(A) (1) only
(B) (2) only
(C) both (1) and (3)
(D) (1), (2), (3) and (4)

95. If $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$, what is the intersection of sets A and B?

(A) $\{1, 2, 3, 4, 5, 6\}$
(B) $\{3, 4\}$
(C) $\{1, 2, 5, 6\}$
(D) $\{1, 2\}$

96. Let U be the universal set and A be a subset of U. If A contains 20 elements and U contains 30 elements, how many elements are in the complement of set A?

(A) 20
(B) 10
(C) 30
(D) 15

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97. What number should fill the blank?

664, 332, 340, 170, ____, 89

(A) 85
(B) 97
(C) 109
(D) 178

98. What number should fill the blank?

U32, V29, ____, X23, Y20

(A) W26
(B) W17
(C) Z17
(D) Z26

99. What number should fill the blank?

FAG, GAF, HAI, IAH, ……..

(A) JAI
(B) HAL
(C) HAK
(D) JAK

100. In a certain code language ‘MADRAS’ is written as ‘OWNHEQ’. How will ‘AFRICA’ be written in that same code?

(A) WYEVJE
(B) EYWJVE
(C) MPJKLM
(D) WYVEJE

101. What comes next in the series?

3, 9, 27, 81, ?

(A) 121
(B) 162
(C) 243
(D) 324

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102. Determine the missing number:

1, 4, 9, 16, 25, ……

(A) 27
(B) 36
(C) 49
(D) 64

103. Identify the next number in the sequence.

2, 6, 12, 20, 30, **?**

(A) 42
(B) 44
(C) 48
(D) 50

104. Which of the following will replace the question mark.

2, 5, 10, 17, **?** , 37

(A) 24
(B) 32
(C) 50
(D) 26

105. Identify the word that does not adhere to the pattern.

Velocity, Acceleration, Momentum, Force, Inertia

(A) Acceleration
(B) Momentum
(C) Force
(D) Inertia

106. Choose the word that disrupts the sequence.

Fibonacci, Prime, Perfect, Triangular, Composite

(A) Prime
(B) Perfect
(C) Triangular
(D) Composite

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107. Which word does not follow the pattern?

River, Lake, Ocean, Mountain, Stream

(A) Lake
(B) Ocean
(C) Mountain
(D) Stream

108. Select the word that does not fit the pattern.

Cat, Dog, Rabbit, Horse, Fish

(A) Dog
(B) Rabbit
(C) Horse
(D) Fish

109. Arrange the words given below in a meaningful sequence.

A. Heptagon B. Square C. Hexagon D. Polygon E. Triangle

(A) E, B, C, A, D
(B) E, C, B, D, A
(C) E, C, A, B, D
(D) A, C, D, E, B

110. Consider two sets A and B. If $A = \{2, 4, 6, 8\}$ and $B = \{4, 8, 12, 16\}$, what is the intersection of sets A and B?

(A) $\{2, 4, 6, 8\}$
(B) $\{4, 8\}$
(C) $\{12, 16\}$
(D) $\{2, 6, 12, 16\}$

111. If set $X = \{a, b, c\}$ and set $Y = \{b, c, d\}$, what is the symmetric difference of sets X and Y ?

(A) $\{a, b, c, d\}$
(B) $\{a, c, d\}$
(C) $\{a, d\}$
(D) $\{b\}$

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112. Let A, B, and C be three sets. If $A \cap B = \emptyset$ (empty set) and $B \cap C = \{1, 2, 3\}$, what is the intersection of sets A and $(B \cap C)$?

(A) $\{1, 2, 3\}$
(B) $\emptyset$ (empty set)
(C) A
(D) C

113. Let set $A = \{1, 2, 3\}$ and set $B = \{3, 4, 5\}$. What is the Cartesian product of sets A and B?

(A) $\{(1, 3), (2, 4), (3, 5)\}$
(B) $\{(1, 3), (1, 4), (1, 5), (2, 3), (2, 4), (2, 5), (3, 3), (3, 4), (3, 5)\}$
(C) $\{(1, 4), (2, 5), (3, 6)\}$
(D) $\{(3, 3), (3, 4), (3, 5)\}$

114. Given Sets: $X = \{a, b, c, d\}$, $Y = \{b, c, d, e\}$, what is the cardinality of the union of sets X and Y?

(A) 3
(B) 4
(C) 5
(D) 6

115. Pointing to a photograph, a man said, "I have no brother, and that man's father is my father's son." Whose photo was it?

(A) His son
(B) His own
(C) His father
(D) His nephew

116. Prem is in the East of Toby, and Toby is in the North of Joseph. Michael is in the South of Joseph, then in which direction of Prem is Michael?

(A) South-East
(B) South-West
(C) North
(D) North-East

117. A is 6 km West from B. And C is 4 km North from B. D is 12 km South from C. Now D is how far from A?

(A) 13 km
(B) 12 km
(C) 15 km
(D) 10 km

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118. Find the two words that best complete the following sentence:

Though the movie received …… reviews, the audience seemed to ……. it.

(A) mixed, enjoy
(B) positive, hate
(C) negative, love
(D) neutral, dislike

119. Select the related word from the given alternatives.

Fox: Cunning :: Rabbit : ?

(A) Courageous
(B) Dangerous
(C) Timid
(D) Ferocious

120. Pick the odd man out?

(A) just
(B) fair
(C) equitable
(D) biased

121. What is the time complexity of the following code snippet?

```
int sum = 0;
for (int i = 1; i <= n; i++) {
    for (int j = 1; j <= i; j++) {
    sum += j;
    }
}
```

(A) O(n)
(B) O(n^2)
(C) O(log n)
(D) O(1)

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122. What is the output of the following code?

```
#include <stdio.h>
int main() {
     int x = 5;
     printf("%d", x++);
     printf("%d", ++x);
     return 0;
}
```

(A) 56
(B) 66
(C) 57
(D) 66

123. Which of the following is the correct way to declare a 2D array in C with dimensions 3rows × 4columns?

(A) `int array[3][4];`
(B) `int array[4][3];`
(C) `int array[12];`
(D) `int array[3, 4];`

124. What is the output of the following C code snippet?

```
#include <stdio.h>
int main() {
     int i = 0;
     while (i < 5) {
          printf("%d ", i);
          i += 2;
     }
     return 0;
}
```

(A) 0 1 2 3 4
(B) 0 2 4
(C) 1 3
(D) 0 2 4 6 8

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125. What does the following recursive function compute?

```
int mystery(int n) {
     if (n <= 1)
          return n;
     else
          return mystery(n-1) + mystery(n-2);
}
```

(A) Factorial of n
(B) n^{th} Fibonacci number
(C) Sum of first n natural numbers
(D) Exponential of n

126. What is the purpose of the volatile keyword in C?

(A) It declares a constant variable
(B) It indicates that a variable may be changed by multiple threads
(C) It ensures that the variable is stored in the cache
(D) It specifies that the variable's value may be changed at any time by an external entity

127. Which of the following is used to open a file in binary mode for reading and writing in C?



(A) `fopen("file.txt", "rb+");`
(B) `fopen("file.txt", "r+");`
(C) `fopen("file.txt", "wb+");`
(D) `fopen("file.txt", "w+");`

128. What is the correct way to define a macro in C?

(A) #define MAX 100
(B) macro MAX = 100
(C) const MAX = 100
(D) define MAX = 100

129. What does the assert() function in C do?

(A) Checks if a variable is initialized
(B) Evaluates a condition, and if false, terminates the program with an error message
(C) Compares two strings
(D) Allocates memory dynamically

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130. What is the purpose of the #ifdef preprocessor directive in C?

(A) Checks if a variable is defined
(B) Checks if a file exists
(C) Compares two variables
(D) Conditionally includes or excludes code based on whether a macro is defined

131. What is the purpose of the static keyword when applied to a function in C?

(A) Indicates that the function returns a static variable
(B) Restricts the function's scope to the file where it is declared
(C) Declares a function as a static method
(D) Allows the function to be accessed globally

132. What is the primary purpose of the gdb tool in C programming?

(A) Code profiling
(B) Code optimization
(C) Debugging and analyzing programs
(D) Memory allocation

133. The address resolution protocol (ARP) is used for

(A) Finding the IP address from the DNS
(B) Finding the IP address of the default gateway
(C) Finding the IP address that corresponds to a MAC address
(D) Finding the MAC address that corresponds to an IP address

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134. Consider the following C-program:

```
double foo (double); /* Line 1 */
int main()
{
     double da, db;
     // input da
     db = foo(da);
}
double foo(double a)
{
return a;
}
```

Run on IDE: The above code compiled without any error or warning. If Line 1 is deleted, the above code will show:

(A) no compiler-warning or error
(B) some compiler-warnings not leading to unintended results
(C) some compiler-warnings due to type-mismatch eventually leading to unintended results
(D) compiler errors

135. A RAM chip has a capacity of 1024 words of 8 bits each (1K × 8). The number of 2 × 4 decoders with enable line needed to construct a 16K × 16 RAM from 1K × 8 RAM is

(A) 4
(B) 5
(C) 6
(D) 7

136. Consider the following sequence of micro-operations.

MBR ← PC
MAR ← X
PC ← Y
Memory ← MBR

Which one of the following is a possible operation performed by this sequence?

(A) Instruction fetch
(B) Operand fetch
(C) Conditional branch
(D) Initiation of interrupt service

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137. In a compiler, keywords of a language are recognized during

(A) parsing of the program
(B) the code generation
(C) the lexical analysis of the program
(D) dataflow analysis

138. The time taken to switch between user and kernel modes of execution be t1 while the time taken to switch between two processes be t2. Which of the following is TRUE?

(A) t1 > t2
(B) t1 = t2
(C) t1 < t2
(D) Nothing can be said about the relation between t1 and t2

139. What is the purpose of the "break" statement in a loop?

(A) To end the loop immediately and exit the program
(B) To skip the current iteration and move to the next one
(C) To jump to a specific line in the code
(D) To execute a block of code repeatedly

140. Which sorting algorithm has the best average-case time complexity?

(A) Bubble Sort
(B) Quick Sort
(C) Insertion Sort
(D) Selection Sort

141. Which data structure follows the Last In, First Out (LIFO) principle?

(A) Queue
(B) Stack
(C) Linked List
(D) Array

142. What is the primary purpose of the "malloc" function in C?

(A) To perform mathematical calculations
(B) To allocate memory dynamically
(C) To print formatted output
(D) To open a file

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143. What is the output of the following code snippet?

```
int x = 5;
int y = x++;
printf("%d ", y);
printf("%d ", ++x);
```

(A) 5 7
(B) 5 6
(C) 6 7
(D) 6 6

144. What does the following C code snippet do?

```
#include <stdio.h>
int main() {
     char str[] = "Hello";
     printf("%c", str[4]);
     return 0;
}
```

(A) Prints 'H'
(B) Prints 'o'
(C) Prints '\0'
(D) Compile error

145. Which of the following is the correct way to dynamically allocate memory for an integer in C?

(A) int *num = malloc(sizeof(*int));
(B) int *num = malloc(sizeof(int*));
(C) int *num = malloc(sizeof(int));
(D) None of the above

146. What is the output of the following C code snippet?

```
#include <stdio.h>
int main() {
     int i = 5;
     printf("%d", ++i + ++i);
     return 0;
}
```

(A) 12
(B) 11
(C) 10
(D) Compile error

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147. What will be the output of the following C code snippet?

```
#include <stdio.h>
#define SQUARE(x) x * x
int main() {
     int result = SQUARE(3 + 2);
     printf("%d", result);
     return 0;
}
```

(A) 25
(B) 11
(C) 14
(D) Compile error

148. What is the correct syntax for a function pointer in C?

(A) `int (*func)(int a, int b);`
(B) `int *func(int a, int b);`
(C) `int func(int a, int b)();`
(D) `int func*(int a, int b);`

149. What does the following C code snippet do, and what is the potential issue?

```
#include <stdio.h>
int main() {
     int i;
     for (i = 0; i <= 5; i++)
          printf("%d ", i);
     return 0;
}
```

(A) Prints numbers from 0 to 5, no issue
(B) Prints numbers from 0 to 6, potential off-by-one error
(C) Generates a compilation error
(D) Causes an infinite loop

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150. What is the potential issue in the following C code?

```
#include <stdio.h>
int main() {
     char str[5];
     scanf("%s", str);
     printf("%s", str);
     return 0;
}
```

(A) No issue, code is correct
(B) Run-time buffer overflow error can occur if input exceed the array size
(C) Compilation error occurs
(D) Format specifier mismatch error occurs

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ANSWER KEY

Subject Name: 621 M VOC MOBILE PHONE APPLICATION DEVELOPMENT

SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key
1	A	31	C	61	A	91	A	121	B
2	B	32	A	62	B	92	A	122	C
3	A	33	A	63	B	93	C	123	A
4	A	34	B	64	C	94	B	124	B
5	A	35	B	65	C	95	B	125	B
6	B	36	B	66	C	96	B	126	D
7	C	37	C	67	C	97	D	127	A
8	D	38	A	68	C	98	A	128	A
9	C	39	B	69	C	99	D	129	B
10	C	40	B	70	C	100	A	130	D
11	B	41	B	71	C	101	C	131	B
12	A	42	D	72	C	102	B	132	C
13	B	43	C	73	C	103	A	133	D
14	A	44	C	74	C	104	D	134	D
15	B	45	A	75	C	105	A	135	B
16	C	46	D	76	C	106	C	136	D
17	C	47	C	77	D	107	C	137	C
18	B	48	B	78	B	108	D	138	C
19	D	49	B	79	C	109	A	139	B
20	B	50	D	80	A	110	B	140	B
21	C	51	B	81	A	111	C	141	B
22	B	52	D	82	C	112	B	142	B
23	B	53	A	83	B	113	B	143	A
24	A	54	C	84	C	114	C	144	B
25	B	55	C	85	C	115	A	145	C
26	A	56	C	86	A	116	B	146	D
27	B	57	B	87	A	117	D	147	C
28	B	58	C	88	C	118	A	148	A
29	A	59	C	89	B	119	C	149	B
30	C	60	C	90	D	120	D	150	B

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