M.Sc Computer Science

14P/208/4 Question Booklet No.....

(To be filled up by the candidate by blue/ black ball-point pen)

Roll No. | | | | | | | | | |

Roll No.
(Write the digits in words) .....

Serial No. of OMR Answer Sheet .....

Day and Date ....
(Signature of Invigilator)

INSTRUCTIONS TO CANDIDATES

(Use only **blue/black ball-point pen** in the space above and on both sides of the Answer Sheet)

1. Within 10 minutes of the issue of the Question Booklet, check the Question Booklet to ensure that it contains all the pages in correct sequence and that no page/question is missing. In case of faulty Question Booklet bring it to the notice of the Superintendent/Invigilators immediately to obtain a fresh Question Booklet.
2. Do not bring any loose paper, written or blank, inside the Examination Hall *except the Admit Card without its envelope.*
3. A separate Answer Sheet is given. *It should not be folded or mutilated. A second Answer Sheet shall not be provided. Only the Answer Sheet will be evaluated.*
4. Write your *Roll Number and Serial Number of the Answer Sheet by pen* in the space provided above.
5. **On the front page of the Answer Sheet, write by pen your Roll Number in the space provided at the top, and by darkening the circles at the bottom. Also, wherever applicable, write the Question Booklet Number and the Set Number in appropriate places.**
6. No overwriting is allowed in the entries of Roll No., Question Booklet No. and Set No. (if any) on OMR sheet and also Roll No. and OMR Sheet No. on the Question Booklet.
7. Any change in the aforesaid entries is to be verified by the invigilator, otherwise it will be taken as unfair means.
8. Each question in this Booklet is followed by four alternative answers. *For each question, you are to record the correct option on the Answer Sheet by darkening the appropriate circle* in the corresponding row of the Answer Sheet, by ball-point pen as mentioned in the guidelines given on the first page of the Answer Sheet.
9. For each question, darken only one circle on the Answer Sheet. If you darken more than one circle or darken a circle partially, the answer will be treated as incorrect.
10. *Note that the answer once filled in ink cannot be changed.* If you *do not wish to attempt* a question, leave all the circles in the corresponding row blank (such question will be awarded zero mark).
11. For rough work, use the inner back page of the title cover and the blank page at the end of this Booklet.
12. Deposit *only the OMR Answer Sheet* at the end of the Test.
13. You are not permitted to leave the Examination Hall until the end of the Test.
14. If a candidate attempts to use any form of unfair means, he/she shall be liable to such punishment as the University may determine and impose on him/her.

[उपर्युक्त निर्देश हिन्दी में अन्तिम आवरण-पृष्ठ पर दिये गए हैं।

[No. of Printed Pages : 28+2

No. of Questions/प्रश्नों की संख्या : 150

Time/समय : 2 Hours/घण्टे **Full Marks/पूर्णांक :** 450

Note : (1) **Attempt as many questions as you can. Each question carries 3 marks. One mark will be deducted for each incorrect answer. Zero mark will be awarded for each unattempted question.**

अधिकाधिक प्रश्नों को हल करने का प्रयत्न करें। प्रत्येक प्रश्न 3 अंक का है। प्रत्येक गलत उत्तर के लिए एक अंक काटा जाएगा। प्रत्येक अनुत्तरित प्रश्न का प्राप्तांक शून्य होगा।

(2) **If more than one alternative answers seem to be approximate to the correct answer, choose the closest one.**

यदि एकाधिक वैकल्पिक उत्तर सही उत्तर के निकट प्रतीत हों, तो निकटतम सही उत्तर दें।

1. What is the bit storage capacity of a ROM with a 512′ 4-organization?

(1) 2049 (2) 2048 (3) 2047 (4) 2046

2. Associative memory is sometimes called as

(1) virtual memory (2) cache memory

(3) main memory (4) content addressable memory

3. DMA interface unit eliminates the need to use CPU registers to transfer data from

(1) MAR to MBR

(2) MBR to MAR

(3) I/O units to memory

(4) memory to I/O units

4. Suppose that a bus has 16 data lines and requires 4 cycles of 250 nsec each to transfer data. The bandwidth of this bus would be 2 megabytes/sec. If the cycle time of the bus was reduced to 125 nsec and the number of cycles required for transfer stayed the same, what would be bandwidth of the bus?

(1) 1 megabyte/sec

(2) 4 megabytes/sec

(3) 8 megabytes/sec

(4) 2 megabytes/sec

5. In 'C', when a function is recursively called, all automatic variables

(1) are initialized during each execution of the function

(2) are retained from the last execution

(3) are maintained in a stack

(4) are retained from the first execution

6. In 'C' programming, if an array is used as a function argument, the array is passed

(1) by value

(2) by reference

(3) None of these as array cannot be used as a function argument

(4) call by name

7. If $x = 5, y = 2$, then $y \wedge x$ equals ——— (where $\wedge$ is a bitwise XOR operator).

(1) 00000111 (2) 10000010 (3) 10100000 (4) 11001000

8. For JK flipflop $J = 0, K = 1$, the output after clock pulse will be

(1) 1 (2) no change

(3) 0 (4) high impedance

9. In object-oriented programming, advantages of inheritance include

(1) providing a useful conceptual framework

(2) avoiding rewriting of code

(3) facilitating class libraries

(4) All of these

10. Consider the following statements :

```
int x = 22, y = 15;
x = (x > y) ? (x + y) : (x - y);
```

What will be the value of x after executing these statements?

(1) 22 (2) 37

(3) 7 (4) Error. Cannot be executed

11. If 73 (in base-x number system) is equal to 54 (in base-y number system), the possible values of x and y are

(1) 8, 16 (2) 10, 12 (3) 9, 13 (4) 8, 11

12. The for loop

```
for (i = 0; i < 1; ++i)
printf ("%d", i & 1);
```

(1) 0101010101 (2) 0111111111 (3) 0000000000 (4) 1111111111

13. A liaising in the context of programming languages refers to

(1) multiple variables having the same value

(2) multiple variables having the same memory location

(3) multiple variables having the same identifies

(4) multiple uses of the same variable

14. Consider the following statements :

```
int x = 6, y = 8, z, w;
y = x++;
z = ++x;
```

The value of x, y, z by calculating the above expressions are

(1) y = 8, z = 8, x = 6

(2) y = 6, x = 8, z = 8

(3) y = 9, z = 7, x = 8

(4) y = 7, x = 8, z = 7

15. The use of macro in the place of functions

(1) reduces execution time

(2) reduces code size

(3) increases execution time

(4) increases code size

16. If n has the value 3, then the statement $a[++n] = n++$

(1) assigns 4 to $a[5]$

(2) assigns 4 to $a[3]$

(3) assigns 4 to $a[4]$

(4) produces unpredictable results

17. Consider for loop in a 'C' program. If the condition is missing

(1) it is assumed to be present and taken to be false

(2) it is assumed to be present and taken to be true

(3) it result in a syntax error

(4) execution will be terminated abruptly

18. Which of the following file organization is most efficient for a file with a high degree of file activity?

(1) Sequential (2) ISAM (3) VSAM (4) B-tree index

19. Analysis which determines the meaning of a statement once its grammatical structure becomes known is termed as

(1) semantic analysis (2) syntax analysis

(3) regular analysis (4) general analysis

20. A partial ordered relation is transitive, reflexive and

(1) antisymmetric (2) bisymmetric

(3) antireflexive (4) asymmetric

21. If B is a Boolean algebra, then which of the following is true?

(1) B is a finite but not complemented lattice

(2) B is a finite, complemented and distributive lattice

(3) B is a finite, distributive but not complemented lattice

(4) B is not distributive lattice

22. Graphics for Word Processor is

(1) peripheral (2) clip art (3) highlight (4) execute

23. Why are headers and footers used in document?

(1) To enhance the overall appearance of the document

(2) To mark the starting and ending of a page

(3) To make large document more readable

(4) To allow page headers and footers to appear on document when it is printed

24. Which data structure allows deleting data elements from front and inserting at rear?

(1) Stacks (2) Queues (3) Deques (4) Binary search tree

25. The depth of a complete binary tree is given by

(1) $D_n = n \log_2 n$ (2) $D_n = n \log_2 n + 1$

(3) $D_n = \log_2 n$ (4) $D_n = \log_2 n + 1$

26. When representing any algebraic expression E which uses only binary operations in a 2-tree,

(1) the variable in E will appear as external nodes and operations in internal nodes

(2) the operations in E will appear as external nodes and variables in internal nodes

(3) the variables and operations in E will appear only in internal nodes

(4) the variables and operations in E will appear only in external nodes

27. A binary tree can easily be converted into 2-tree

(1) by replacing each empty sub tree by a new internal node

(2) by inserting an internal nodes for non-empty node

(3) by inserting an external nodes for non-empty node

(4) by replacing each empty sub tree by a new external node

28. When converting binary tree into extended binary tree, all the original nodes in binary tree are

(1) internal nodes on extended tree (2) external nodes on extended tree

(3) vanished on extended tree (4) internal nodes

29. The post order traversal of a binary tree is DEBFCA. Find out the pre order traversal

(1) ABFCDE (2) ADBFEC (3) ABDECF (4) ABDCEF

30. Which of the following sorting algorithm is of divide-and-conquer type?

(1) Bubble sort (2) Insertion sort

(3) Quick sort (4) All of the above

31. An algorithm that calls itself directly or indirectly is known as

(1) sub algorithm (2) recursion

(3) polish notation (4) traversal algorithm

32. In a binary tree, certain null entries are replaced by special pointers which point to nodes higher in the tree for efficiency. These special pointers are called

(1) leaf (2) branch (3) path (4) thread

33. The in order traversal of tree will yield a sorted listing of elements of tree in

(1) binary trees (2) binary search trees

(3) heaps (4) threaded tree

34. In a heap tree

(1) values in a node is greater than every value in left sub tree and smaller than right sub tree

(2) values in a node is greater than every value in children of it

(3) both of above condition applies

(4) values in a node is less than every value in children of it

35. In a graph if $e=[u, v]$, then u and v are called

(1) endpoints of e (2) adjacent nodes

(3) neighbours (4) All of the above

36. A connected graph T without any cycles is called

(1) a tree graph (2) free tree

(3) a tree (4) All of the above

37. In a graph if $e=(u, v)$ means

(1) u is adjacent to v but v is not adjacent to u

(2) e begins at u and ends at v

(3) u is processor and v is successor

(4) Both (2) and (3)

38. If every node u in G is adjacent to every other node v in G, A graph is said to be

(1) isolated (2) complete

(3) finite (4) strongly connected

39. Stack is useful for implementing

(1) radix sort (2) breadth first search

(3) recursion (4) depth first search

40. A B C is a set of attributes. The functional dependency is as follows

$AB \rightarrow B$

$AC \rightarrow C$

$C \rightarrow B$

(1) is in 1NF (2) is in 2NF

(3) is in 3NF (4) is in BCNF

41. In mapping of ERD to DFD

(1) entities in ERD should correspond to an existing entity/store in DFD

(2) entity in DFD is converted to attributes of an entity in ERD

(3) relations in ERD has 1 to 1 correspondence to processes in DFD

(4) relationships in ERD has 1 to 1 correspondence to flows in DFD

42. A dominant entity is the entity

(1) on the N side in a 1 : N relationship

(2) on the 1 side in a 1 : N relationship

(3) on either side in a 1 : 1 relationship

(4) nothing to do with 1 : 1 or 1 : N relationship

43. Three tier architecture contains —— layers.

(1) presentation (2) application

(3) database (4) All of the above

44. Tables derived from the ERD

(1) are totally unnormalised (2) are always in 1NF

(3) can be further denormalised (4) may have multi-valued attributes

45. An instance of relational schema R (A, B, C) has distinct values of A including Null values. Which one of the following is true?

(1) A is a candidate key
(2) A is not a candidate key
(3) A is a primary key
(4) Both (1) and (3)

46. The concept of locking can be used to solve the problem of

(1) lost update
(2) uncommitted dependency
(3) inconsistent data
(4) All of the above

47. A data model is a collection of conceptual tools for describing

(1) data and data relationships
(2) data semantics and consistency constraints
(3) data, data relationship, data semantics and consistency constraints
(4) Both (1) and (2)

48. The result of the UNION operation between R1 and R2 is a relation that includes

(1) all the tuples of R1
(2) all the tuples of R2
(3) all the tuples of R1 and R2
(4) all the tuples of R1 and R2 which have common columns

49. Redundancy is dangerous as it is a potential threat to data ———.

(1) integrity
(2) consistency
(3) sufficiency
(4) Both (1) and (2)

50. What are the potential problems when a DBMS executes multiple transactions concurrently?

(1) The lost update problem (2) The dirty read problem

(3) The unrepeatable read problem (4) All of the above

51. In Boolean expression $A+BC$ equals

(1) $(A+B)(A+C)$ (2) $(A'+B)(A'+C)$

(3) $(A+B)(A'+C)$ (4) $(A+B)C$

52. All of the following are examples of real security and privacy risks, *except*

(1) hackers (2) span (3) viruses (4) identity theft

53. Technology no longer protected by copyright, available to everyone, is considered to be

(1) proprietary (2) open

(3) experimental (4) in the public domain

54. A goal of data mining includes which of the following ?

(1) To explain some observed event or condition

(2) To confirm that data exists

(3) To analyze data for expected relationships

(4) To create a new data warehouse

55. Data independence means

(1) data is defined separately and not included in programs

(2) programs are not dependent on the physical attributes of data

(3) programs are not dependent on the logical attributes of data

(4) Both (2) and (3)

56. When data changes in multiple lists and all lists are not updated, this causes

(1) data redundancy
(2) information overload
(3) duplicate data
(4) data inconsistency

57. The purpose of the primary key in a database is to

(1) unlock the database
(2) provide a map of the data
(3) uniquely identify a record
(4) establish constraints on database operations

58. The most frequently used instructions of a computer program are likely to be fetched from

(1) the hard disk
(2) cache memory
(3) RAM
(4) registers

59. Verification of a login name and password is known as

(1) configuration
(2) accessibility
(3) authentication
(4) logging in

60. RSA is

(1) symmetric cryptosystem
(2) asymmetric cryptosystem
(3) block cypher
(4) digital signature

61. The altering of data so that it is not usable unless the changes are undone is

(1) biometrics (2) compression (3) encryption (4) ergonomics

62. Register is a

(1) set of capacitors used to register input instructions in a digital computer

(2) set of paper tapes and cards put in a file

(3) temporary storage unit within the CPU having dedicated or general purpose use

(4) part of the auxiliary memory

63. Which one of the following is not a broadband communication medium?

(1) Microwave

(2) Fibre optic cable

(3) Twisted pair

(4) Coaxial cable

64. In which type of switching all the datagrams of a message follow the same channel?

(1) Circuit-switching

(2) Datagram packet switching

(3) Virtual circuit packet switching

(4) Message switching

65. When you purchase a product over a mobile phone, the transaction is called

(1) web commerce

(2) e-commerce

(3) m-commerce

(4) mobile purchases

66. A Pixel is

(1) a computer program that draws picture

(2) a picture stored in secondary memory

(3) the smallest resolvable part of a picture

(4) All of the above

67. The memory location address are limited to

(1) 00000 to 9ffff(16)
(2) 00001 to 9ffff(16)
(3) 00010 to 9ffff(16)
(4) 10000 to 9ffff(16)

68. The contents of information are stored in

(1) memory data register
(2) memory address register
(3) memory access register
(4) memory arithmetic register

69. A proxy server is used for which of the following?

(1) To provide security against unauthorized users
(2) To process client requests for web pages
(3) To process client requests for database access
(4) To provide TCP/IP

70. Which of the following are characteristics of testable software?

(1) Observability
(2) Simplicity
(3) Stability
(4) All of the above

71. A characteristic of a file server is which of the following?

(1) Manages file operations and is shared on a network
(2) Manages file operations and is limited to one PC
(3) Acts as fat client and is shared on a network
(4) Acts as fat client and is limited to one PC

72. Queue can be used to implement

(1) radix sort
(2) quick sort
(3) recursion
(4) depth first search

73. The member of edges in a regular graph of degree d and n vertices is

(1) maximum of n, d
(2) $n+d$
(3) nd
(4) $nd/2$

74. Heap allocation is required for languages

(1) that supports recursion
(2) that supports dynamic data structure
(3) that use dynamic scope rules
(4) All of the above

75. The maximum number of comparisons needed to sort 7 items using radix sort is (assume each item is a 4 digit decimal number)

(1) 280
(2) 40
(3) 47
(4) 38

76. A graph with n vertices will definitely have a parallel edge or self loop of the total number of edges are

(1) more than n
(2) more than $n+1$
(3) more than $(n+1)/2$
(4) more than $n(n-1)/2$

77. If h is any hashing function and is used to hash n keys into a table of size m, where $n \leq m$, the expected number of collisions involving a particular key x is

(1) less than 1
(2) less than n
(3) less than m
(4) less than $n/2$

78. The minimum number of edges in a connected cycle graph on n vertices is

(1) $n-1$ (2) n (3) $n+1$ (4) $n/2$

79. In a binary tree, the number of terminal or leaf nodes is 10. The number of nodes with two children is

(1) 9 (2) 11 (3) 15 (4) 20

80. A circular list can be used to represent

(1) a stack (2) a queue

(3) B-tree (4) Both (1) and (2)

81. The smallest element of an Array's index is called its

(1) lower bound (2) upper bound (3) range (4) extraction

82. Which amongst the following cannot be a balance factor of any node of an AVL tree?

(1) 1 (2) 0 (3) 2 (4) -1

83. Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?

(1) Deleting a node whose location is given

(2) Searching of an unsorted list for a given item

(3) Inserting a new node after node whose location is given

(4) Traversing the list to process each node

84. Search tables used by compilers for efficient searching generally use

(1) hash tables (2) linear lists of records

(3) binary search tables (4) binary search trees

85. Which of the following sort method is stable?

(1) Straight insertion sort
(2) Binary insertion sort
(3) Shell sort
(4) Heap sort

86. One can determine whether a binary tree is a binary search tree by traversing it in

(1) preorder
(2) inorder
(3) postorder
(4) any of the three orders

87. The search technique for searching a stored file that requires increased amount of space is

(1) indexed sequential search
(2) interpolation search
(3) sequential search
(4) tree search

88. Which of the following is essential for converting an infix expression to the post fix form efficiently?

(1) An operator stack
(2) An operand stack
(3) An operand stack and an operator stack
(4) A parse tree

89. In —— the difference between the height of the left sub tree and height of the right tree, for each node, is almost one.

(1) binary search tree
(2) AVL tree
(3) complete tree
(4) threaded binary tree

90. Number of possible binary trees with 3 nodes is

(1) 12
(2) 13
(3) 14
(4) 15

91. A complete full binary tree with 10 leaves

(1) cannot have more than 19 nodes (2) has exactly 19 nodes

(3) has exactly 17 nodes (4) cannot have more than 17 nodes

92. In a linked list

(1) each link contains a pointer to the next link

(2) an array of pointers point to the links

(3) each link contains data or pointer to data

(4) Both (1) and (3)

93. An adjacency matrix representation of graph cannot contain information of

(1) nodes (2) edges

(3) direction of edge (4) parallel edges

94. Part of program where the shared memory is accessed and which should be executed indivisibly, is called

(1) semaphores (2) directory

(3) critical section (4) mutual exclusion

95. What is the initial value of the semaphore to allow only one of the many processes to enter their critical section?

(1) 0 (2) 1 (3) 2 (4) 3

96. The principle of locality of reference justifies the use of

(1) virtual memory (2) interrupts

(3) secondary memory (4) cache memory

97. Four necessary conditions for deadlock to exist are mutual exclusion, no-preemption, circular wait and

(1) hold and wait (2) multiprogramming

(3) race around condition (4) buffer overflow

98. Memory utilization factor shall be computed as follows

(1) memory in use/allocated memory

(2) memory in use/total memory connected

(3) memory allocated/free existing memory

(4) memory committed/total memory available

99. In which of the storage placement strategies a program is placed in the smallest available hole in the main memory?

(1) Best fit (2) First fit (3) Worst fit (4) Buddy

100. A critical section is a program segment

(1) which should run in a certain specified amount of time

(2) which avoids deadlocks

(3) where shared resources are accessed

(4) which must be enclosed by a pair of semaphore operations, P and V

101. An operating system contains 3 user processes each requiring 2 units of resource R. The minimum number of units of R such that no deadlocks will ever arise is

(1) 4 (2) 3 (3) 5 (4) 6

102. Page fault frequency in an operating system is reduced when the

(1) processes tend to the I/O-bound

(2) size of pages is reduced

(3) processes tend to be CPU-bound

(4) locality of reference is applicable to the process

103. Concurrent processes are processes that

(1) do not overlap in time

(2) overlap in time

(3) are executed by a processor at the same time

(4) not executed by processor

104. Fragmentation is

(1) dividing the secondary memory into equal sized fragments

(2) dividing the main memory into equal sized fragments

(3) fragments of memory words used in a page

(4) fragments of memory words unused in a page

105. In a paged memory systems, if the page size is increased, then the internal fragmentation generally

(1) becomes less

(2) becomes more

(3) remains constant

(4) discard

106. In Round Robin CPU scheduling, as the time quantum is increased, the average turn around time

(1) increases (2) decreases

(3) remains constant (4) varies irregularly

107. Which of the following scheduling policy is well suited for a time-shared operating system?

(1) Shortest job first (2) Round Robin

(3) First-come-first-serve (4) Elevator

108. Thrashing

(1) reduces page I/O

(2) decreases the degree of multiprogramming

(3) implies excessive page I/O

(4) improves the system performance

109. A scheduler which selects processes from secondary storage device is called

(1) short-term scheduler (2) long-term scheduler

(3) medium term scheduler (4) process scheduler

110. Which of the following is not a standard synchronous communication protocol?

(1) PAS (2) DDCMP (3) HDLC (4) SDLC

111. The interactive transmission of data within a time sharing system may be best suited to

(1) simplex lines (2) half-duplex lines

(3) full duplex lines (4) biflex lines

112. Which of the following is an example of a bounded medium?

(1) Coaxial cable
(2) Wave guide
(3) Fiber optic cable
(4) All of the above

113. What is the main difference between synchronous and asynchronous transmission?

(1) The bandwidth required is different
(2) The pulse height is different
(3) The clocking is derived from the data in synchronous transmission
(4) The clocking is mixed with data in asynchronous transmission

114. One important characteristic of LAN is

(1) parallel transmission
(2) low cost access for low bandwidth channels
(3) unlimited expansion
(4) application independent interfaces

115. Which of the following is possible in a token passing bus network?

(1) Unlimited number of stations
(2) Unlimited distance
(3) In-service expansion
(4) Multiple time-division-channels

116. The X.25 standard specifies a

(1) technique for dial access
(2) data bit rate
(3) DTE/DCE interface
(4) technique for start-stop data

117. How many OSI layers are covered in the X.25 standard?

(1) Three (2) Four (3) Two (4) Seven

118. Layer one of the OSI model is

(1) physical layer (2) link layer

(3) transport layer (4) network layer

119. In OSI network architecture, the routing is performed by

(1) data link layer (2) network layer

(3) transport layer (4) session layer

120. The basic ethernet design does not provide

(1) access control

(2) addressing

(3) automatic retransmission of a message

(4) multiple time-division-channels

121. The topology with highest reliability is

(1) bus topology (2) star topology

(3) ring topology (4) mesh topology

122. Start and stop bits are used in serial communication for

(1) error detection (2) error correction

(3) synchronization (4) slowing down the communication

123. End-to-end connectivity is provided from host-to-host in

(1) the network layer
(2) the transport layer
(3) the session layer
(4) application layer

124. BSC is a

(1) character oriented protocol
(2) half-duplex protocol
(3) full-duplex protocol
(4) Both (1) and (2)

125. Which of the following are non-polling systems?

(1) TDMA
(2) Stop and Wait
(3) Xon/Xoff
(4) Both (1) and (3)

126. The number of elements in the power set of the set $\{\{\}, 1, \{2, 3\}\}$ is

(1) 2 (2) 4 (3) 8 (4) 3

127. Let $f(x+y) = f(x)\, f(y)$, for all x, y, if $f(5) = 2$ and $f'(0) = 3$, then $f'(5)$ is equal to

(1) 1 (2) 5 (3) 6 (4) -1

128. An object that groups together a set of operations that have no relations to each other is known as

(1) entity abstraction
(2) action abstraction
(3) virtual machine abstraction
(4) coincidental abstraction

129. In the set of integers, a relation R is defined as a Rb, if and only if b = |a|. This relation is

(1) reflexive
(2) irreflexive
(3) symmetric
(4) anti-symmetric

130. For a function to be invertible, it has to be

(1) one-one
(2) onto
(3) both one-one and onto
(4) one to many

131. Trapezoidal rule gives the exact solution when the curve is

(1) concave towards the base line
(2) convex towards the base line
(3) a straight line
(4) parabola

132. A group has 11 elements. The number of proper sub-group it can have is

(1) 0
(2) 11
(3) 5
(4) 4

133. What is the total number of equivalent relations that can be defined on the set {1, 2, 3}?

(1) 8
(2) 64
(3) 5
(4) 3

134. Two isomorphic graphs must have

(1) the same number of vertices
(2) the same number of edges
(3) an equal number of vertices
(4) All of the above

135. A graph consisting of only isolated n vertices is

(1) 1-chromatic
(2) 2-chromatic
(3) 3-chromatic
(4) n-chromatic

136. If B is a circuit matrix of a graph with k components, the rank of the incident matrix $A(G)$ of the graph is

(1) $n-k$ (2) $e-n-k$ (3) $e-n+k$ (4) $e+n-k$

137. The determinant of matrix has 720 terms (in the unsimplified form). The order of the matrix is

(1) 5 (2) 6 (3) 7 (4) 8

138. For what value of c, will the vector $i+cj$ be orthogonal to $2i-j$?

(1) 0 (2) 1 (3) 2 (4) 3

139. Let $f(x)$ represent the largest integer less than or equal to x. Let $g(x)$ represent the smallest integer greater than or equal to x. Which of the following remark will be true for any x ?

(1) $g(x)=f(x)+1$ (2) $f(x)=g(x)$

(3) $f(-x)=-g(x)$ (4) All of the above

140. Which of the following logical operations almost resembles an arithmetic multiplication operation?

(1) OR (2) AND (3) NOR (4) XOR

141. If $a-b<n$ and $b-c<m$, then $a-c$ is

(1) $<n+m$ (2) < maximum of m, n

(3) < minimum of m, n (4) $<mn$

142. Let A, B, C independent events with probabilities 0·8, 0·5, 0·3. The probability of occurrence of at least one of these three is

(1) 0·3 (2) 0·93 (3) 0·12 (4) 0·07

143. A polynomial $p(x)$ satisfies the following

$$p(1) = p(3) = p(5) = 1$$
$$p(2) = p(4) = -1$$

The minimum degree of such polynomial is

(1) 1 (2) 2 (3) 3 (4) 4

144. What is the relation R on the set $A = \{a, b, c\}$ if whenever aRb and bRc, then aRc?

(1) Transitive (2) Equivalence (3) Reflexive (4) Symmetric

145. According to principle of logic, an implication and its contrapositive must be

(1) both true or false (2) both true

(3) both false (4) both true and false

146. A memory bus is mainly used for communication between

(1) processor and memory (2) processor and I/O devices

(3) I/O devices and memory (4) input device and output device

147. The idea of cache memory is based

(1) on the property of locality of reference

(2) on the heuristic 90-10 rule

(3) on the fact that references generally tend to cluster

(4) All of the above

148. The register which contains the instruction that is to be executed is known as

(1) index register (2) instruction register

(3) memory address register (4) memory data register

149. If memory access takes 20 ns with cache and 110 ns without it, then the ratio (cache uses a 10 ns memory) is

(1) 93% (2) 90% (3) 88% (4) 87%

150. The average time required to reach a storage location in memory and obtain its contents is called the

(1) seek time (2) turnaround time

(3) access time (4) transfer time

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अभ्यर्थियों के लिए निर्देश

(इस पुस्तिका के प्रथम आवरण-पृष्ठ पर तथा उत्तर-पत्र के दोनों पृष्ठों पर केवल नीली या काली बाल-प्वाइंट पेन से ही लिखें)

1. प्रश्न पुस्तिका मिलने के 10 मिनट के अन्दर ही देख लें कि प्रश्नपत्र में सभी पृष्ठ मौजूद हैं और कोई प्रश्न छूटा नहीं है। पुस्तिका दोषयुक्त पाये जाने पर इसकी सूचना तत्काल कक्ष-निरीक्षक को देकर सम्पूर्ण प्रश्नपत्र की दूसरी पुस्तिका प्राप्त कर लें।

2. परीक्षा भवन में *लिफाफा रहित प्रवेश-पत्र के अतिरिक्त,* लिखा या सादा कोई भी खुला कागज साथ में न लायें।

3. उत्तर-पत्र अलग से दिया गया है। ***इसे न तो मोड़ें और न ही विकृत करें। दूसरा उत्तर-पत्र नहीं दिया जायेगा, केवल उत्तर-पत्र का ही मूल्यांकन किया जायेगा।***

4. अपना *अनुक्रमांक तथा उत्तर-पत्र का क्रमांक प्रथम आवरण-पृष्ठ पर पेन* से निर्धारित स्थान पर लिखें।

5. **उत्तर-पत्र के प्रथम पृष्ठ पर पेन से अपना अनुक्रमांक निर्धारित स्थान पर लिखें तथा नीचे दिये वृत्तों को गाढ़ा कर दें। जहाँ-जहाँ आवश्यक हो वहाँ प्रश्न-पुस्तिका का क्रमांक तथा सेट का नम्बर उचित स्थानों पर लिखें।**

6. ओ० एम० आर० पत्र पर अनुक्रमांक संख्या, प्रश्न-पुस्तिका संख्या व सेट संख्या (यदि कोई हो) तथा प्रश्न-पुस्तिका पर अनुक्रमांक सं० और ओ० एम० आर० पत्र सं० की प्रविष्टियों में उपरिलेखन की अनुमति नहीं है।

7. उपर्युक्त प्रविष्टियों में कोई भी परिवर्तन कक्ष निरीक्षक द्वारा प्रमाणित होना चाहिये अन्यथा यह एक अनुचित साधन का प्रयोग माना जायेगा।

8. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं। ***प्रत्येक प्रश्न के वैकल्पिक उत्तर के लिये आपको उत्तर-पत्र की सम्बन्धित पंक्ति के सामने दिये गये वृत्त को उत्तर-पत्र के प्रथम पृष्ठ पर दिये गये निर्देशों के अनुसार पेन से गाढ़ा करना है।***

9. प्रत्येक प्रश्न के उत्तर के लिये केवल एक ही वृत्त को गाढ़ा करें। एक से अधिक वृत्तों को गाढ़ा करने पर अथवा एक वृत्त को अपूर्ण भरने पर वह उत्तर गलत माना जायेगा।

10. ध्यान दें कि एक बार स्याही द्वारा अंकित उत्तर बदला नहीं जा सकता है। यदि आप किसी प्रश्न का *उत्तर नहीं देना चाहते हैं,* तो सम्बन्धित पंक्ति के सामने दिये गये सभी वृत्तों को खाली छोड़ दें। ऐसे प्रश्नों पर शून्य अंक दिये जायेंगे।

11. रफ कार्य के लिये प्रश्न-पुस्तिका के मुखपृष्ठ के अन्दर वाले पृष्ठ तथा अंतिम पृष्ठ का प्रयोग करें।

12. परीक्षा के उपरान्त केवल ***ओ०एम०आर० उत्तर-पत्र*** परीक्षा भवन में जमा कर दें।

13. परीक्षा समाप्त होने से पहले परीक्षा भवन से बाहर जाने की अनुमति नहीं होगी।

14. यदि कोई अभ्यर्थी परीक्षा में अनुचित साधनों का प्रयोग करता है, तो वह विश्वविद्यालय द्वारा निर्धारित दंड का/की, भागी होगा/होगी।