

This Question Booklet contains
16 printed pages

PGCO

A
Seal Sticker

Total Marks : 100
Time : 100 Minutes

Question
Booklet
Code :

A

Candidate's
Seat No. :

Candidate's Signature _____ Block Supervisor's Signature _____

DO NOT OPEN QUESTION BOOKLET UNTIL INSTRUCTED.

INSTRUCTIONS FOR CANDIDATE:

1. Check Number printed on your OMR SHEET and Question Paper with your SEAT No. before answering the questions. Consult block supervisors in case the above mentioned numbers do not match with your seat number.
2. There are total 100 questions. For answer of each question A, B, C, D, E options are given in OMR SHEET. In OMR SHEET, there is "E" option. "E" option is for "Not Attempted". If candidate do not wish to answer the question he/she should select "E" option (Not Attempted). All questions are compulsory.

For Example:

Which state of India has the longest sea shore ?

A ☐ B ☐ C ☒ D ☐ E ☐

(A) Maharashtra (B) Tamilnadu
(C) Gujarat (D) Andhra Pradesh

In this example, the right answer is (C). Therefore, the Circle of (C) has been darkened (encoded). Candidate should not give the answer "Gujarat" in writing.

The options once darkened/answered by candidate cannot be changed.

3. Candidates are not permitted to leave examination hall during examination.
4. Candidates must strictly enter SEAT NO. in the designated space provided in OMR SHEET as well as Question Paper neatly as soon as they receive the OMR SHEET & Question Paper.
5. Candidates must not write name or put any identification sign/symbol on OMR SHEET. In such case strict disciplinary action will be taken against candidate & will be considered disqualified/ineligible. Only Seat No. must be

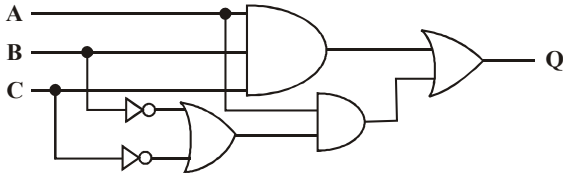
entered at designated space provided in OMR SHEET.

6. Both, Candidate's & Supervisor's signature must be done on Certificate of OMR SHEET. Unsigned OMR SHEET would not be considered for evaluation.
7. Candidates are not permitted to use or carry with them any kind of literature, guide, hand written notes, or printed books, mobile phone, pagers, smart watches, camera or any electronic gadgets to examination hall.
8. Use of only Non-scientific / Non-programmable calculator shall allow during examination.
9. Candidates are not permitted to talk/discuss in the Examination Hall. Any candidate found violating supervisor's instructions will be disqualified.
10. Candidates must fully darken circle A, B, C, D and E accordingly with Blue / Black ball pen. If answers are marked with any other coloured ball pen, pencil, white ink (whitner), any corrections are done by candidate by means of blade or rubber or whitner will not be considered for evaluation.
11. Candidates may carry QP with them after Examination.
12. **For correct answer 1 (One) marks will be given.**

If candidate gives more than one option as answer for one question in answer sheet (OMR SHEET), or gives wrong answer then the candidate will be allotted Zero (0) marks.

If candidate does not want to answer a particular question and marks (E) or leave the option without encoding on OMR sheet, then no minus marks will be given.

Submit the OMR SHEET to the block supervisor after completion of examination without fail before leaving examination hall, failure to do so will result in disqualification of the candidature for the examination and disciplinary action will be taken against such candidate.

1. The _____ gate is also called any or all gate
 (A) AND (B) NOT
 (C) OR (D) EXOR
2. After counting 0, 1, 10, 11 the next binary number is
 (A) 100 (B) 111
 (C) 110 (D) 101
3. The 2'S complement of a number 1000 is
 (A) 1001 (B) 0111
 (C) 1000 (D) 0011
4. What is hexadecimal equivalent of 44845 ?
 (A) AO2F (B) AF2D
 (C) ABCD (D) None of the above
5. What will be the simplified logic expression of give figure ?

 (A) $Q = ABC + \bar{A}\bar{B} + \bar{A}\bar{C}$ (B) $Q = ABC + (\bar{A} + \bar{B})A$
 (C) $Q = ABC + \bar{A}\bar{B} + \bar{B}\bar{C}$ (D) $Q = ABC + \bar{A}\bar{B} + \bar{A}\bar{C}$
6. How many 2-input NAND gates required to create half adder ?
 (A) 4 (B) 3
 (C) 6 (D) 5
7. An example of the application of SR flip flop is
 (A) Adder (B) Counter
 (C) Subtractor (D) None of the above
8. The logic circuit whose output depends on present input and past output is called
 (A) Sequential circuit (B) Combinational circuit
 (C) Both (A) and (B) (D) None of the above
9. Which of the following operation performed by computer on data stored in register ?
 (A) Register Transer (B) Logical
 (C) Arithmetic (D) All of above
10. The program counter stores _____ of the instruction to be run
 (A) Data (B) Counter
 (C) Address (D) None of the above

11. Consider following sequence of micro operation
 MBR $\leftarrow$ PC
 MAR $\leftarrow$ X
 PC $\leftarrow$ Y
 memory $\leftarrow$ MBR
 (A) Instruction Fetch (B) Operand Fetch
 (C) Conditional branch (D) Initiation of Interrupt
12. High speed memory storage in the CPU for storing part of program or data during execution is called
 (A) RAM (B) ROM
 (C) DISK (D) Cache memory
13. Which of the following register stores output of the computation?
 (A) Program counter (B) Storage register
 (C) Accumulator (D) None of the above
14. To get physical address from logical address generated by CPU _____ is used
 (A) TLB (B) MMU
 (C) Overlays (D) All of above
15. Which of the following addressing mode is best suited for accessing elements of array of continuous memory location?
 (A) Indexed addressing mode (B) Relative addressing mode
 (C) Both (A) and (B) (D) None of the above
16. During DMA transfer DMA controller transfers data
 (A) Direct between memory & Register
 (B) Directly from memory to CPU
 (C) Directly between IO module & main memory
 (D) None of the above
17. How is an array initialized in C language
 (A) `int a[3] = {1,2,3};` (B) `int a {1,2,3};`
 (C) `int a[] = new int [3]` (D) `int a = [1,2,3]`
18. Which of the following is a nonlinear data structure?
 (A) Array (B) Binary Tree
 (C) Graphs (D) Both (B) and (C)
19. When a pop() operation is called on an empty stack, which condition occurs?
 (A) Overflow (B) Underflow
 (C) Syntax error (D) None of the above
20. Which of the following data structures finds its use in recursion ?
 (A) Linked list (B) Stack
 (C) queue (D) all of the above

21. What is the output of following

```
# include <stdio.h>
```

```
int main()
```

```
{
```

```
void demo();
```

```
void (*fun) ();
```

```
fun = demo;
```

```
(*fun)();
```

```
fun();
```

```
return 0;
```

```
}
```

```
void demo()
```

```
{
```

```
printf ("Hello");
```

```
}
```

(A) Hello

(B) HelloHello

(C) Compile time error

(D) None of the above

22. Can a function return multiple values in C?

(A) Yes, directly

(B) No

(C) Yes, by using pointers

(D) Both (A) and (C)

23. What are global variables in C ?

(A) variable declared inside the function

(B) variable declared in main function only

(C) variables that can be accessed by any function in the program

(D) none of the above

24. In following C code which variable has longest scope ?

```
int a;
```

```
int main()
```

```
{
```

```
int b;
```

```
:: ::
```

```
}
```

```
int c;
```

(A) a

(B) b

(C) c

(D) all of the above

25. Dijkstra's algorithm is the example of

(A) Dynamic programming

(B) Backtracking

(C) Greedy algorithm

(D) None of the above

26. If a problem can be broken into subproblems which are reused several times, the problem possesses _____ property
- (A) Overlapping subproblems (B) Optimal substructure
(C) Memorization (D) Greedy
27. What is the time complexity of recursive implementation used to find the n^{th} fibonacci term ?
- (A) $O(1)$ (B) $O(n^2)$
(C) $O(n!)$ (D) Exponential
28. Which of the following problem can not be solved by backtracking method?
- (A) n-queen problem (B) subset sum problem
(C) hamiltonian circuit problem (D) travelling salesman problem
29. What is the worst case complexity of the Quick sort?
- (A) $O(n \log n)$ (B) $O(n)$
(C) $O(n^3)$ (D) $O(n^2)$
30. Problems that can not be solved by any algorithm are called.
- (A) tractable problems (B) intractable problems
(C) undecidable problems (D) decidable problems
31. Which of the following problems is not NP complete?
- (A) Bin packing (B) Partition problem
(C) Halting problem (D) None of the above
32. What is the advantage of recursive approach than iterative approach?
- (A) Consumer less memory (B) Less code and easy to implement
(C) Consumes more memory (D) More code
33. Regular expression a/b denotes the set
- (A) $\{ \epsilon, a, b \}$ (B) $\{ a \}$
(C) $\{ ab \}$ (D) $\{ a, b \}$
34. The regular sets are closed under
- (A) Union (B) Concatenation
(C) Kleenes closure (D) All of above
35. Let $\Sigma = \{0,1\}$, $L = \Sigma^*$ and $R = \{0^n 1^n \text{ such that } n > 0\}$ then the language $L \cup R$ and R respectively are
- (A) Regular, Regular (B) Not regular, Regular
(C) Regular, not regular (D) Context tree, not regular
36. A PDM behaves like a TM when the number of auxiliary memory it has, is
- (A) 0 (B) 1 or more
(C) 2 or more (D) none of the above
37. Finite state machine can recognize
- (A) any grammer (B) only context free grammar
(C) only regular grammar (D) none of the above

38. A language L is accepted by a finite automation if and only if it is
 (A) Context sensitive (B) Context free
 (C) Right linear (D) Recursive
39. In the following grammar :
 $x ::= x \oplus y/4$
 $y ::= z * y/2$
 $z ::= \text{id}$
 Which of the following is true?
 (A) $\oplus$ is left associative, $*$ is right associative
 (B) Both $\oplus$ and $*$ are left associative
 (C) $\oplus$ right associative, $*$ is left associative
 (D) None of the above
40. The CFG
 $S \rightarrow as \mid bs \mid a \mid b$ is equivalent to regular expression _____
 (A) $(a + b)$ (B) $(a + b) (a + b)^*$
 (C) $(a + b) (a + b)$ (D) None of the above
41. Arrange following stages of the lexical analysis process in the correct order
 a. Token classification
 b. Tokenization
 c. Input preprocessing
 d. Output Generation
 e. Token validation
 (A) c, b, a, e, d (B) b, c, a, e, d
 (C) c, b, e, a, d (D) a, b, c, d, e
42. Match the following

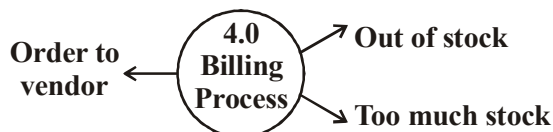
p. Lexical Analysis	i. Leftmost derivation
q. Top down passing	ii. Type checking
r. Semantic analysis	iii. Regular expression
s. Runtime Environments	iv. Activation records

 (A) p - i, q - ii, r - iv, s - iii (B) p - iii, q - i, r - ii, s - iv
 (C) p - ii, q - iii, r - i, s - iv (D) p - iv, q - i, r - ii, s - iii
43. The macro preprocessor must perform
 (A) Recognise macro definitions and macro call
 (B) save the macro definitions
 (C) expand macro calls and substitute arguments
 (D) All of the above

44. What is a linear analysis called in a compiler
- (A) Testing (B) Lexical Analysis
(C) Scanning (D) Both (B) and (C)
45. Thread is a
- (A) light weight process (B) heavy weight process
(C) multi process (D) IO process
46. To access the services of operating system the interface is provided by the
- (A) API (B) Library
(C) System Call (D) Assembly instructions
47. Determine the number of page faults when references to pages occur in following order;
1, 2, 4, 5, 2, 1, 2, 4
- Assume that the main memory can accommodate 3 pages and the main memory already has the page 1 and 2 with page 1 having been brought earlier than page 2 (LRU algorithm is used)
- (A) 3 (B) 5
(C) 4 (D) none of the above
48. When a process creates a new process, two possibilities for execution exist
1. The parent continues to execute concurrently with its children
 2. The parent stop to execute concurrently with its children
 3. The parent waits until some or all of its children have terminated
 4. The parent does not wait until some or all of its children have terminated
- (A) 1 and 2 (B) 2 and 3
(C) 2 and 4 (D) 1 and 3
49. Two fundamental models for Interprocess communication are
1. Shared memory
 2. Message passing
 3. Independent
 4. Cooperating
- (A) 1, 2 (B) 2, 3
(C) 3, 4 (D) 1, 4
50. Copying a process from memory to disk to allow space for other processes is called
- (A) Deadlock (B) Swapping
(C) page fault (D) all of above
51. The process of organizing data into tables and establishing relationship between them is known as
- (A) Data mining (B) Data modeling
(C) Database design (D) None of the above
52. In the context of database security what does the term authentication refer to ?
- (A) Ensuring data is not corrupted (B) Verifying user identity
(C) Encrypting data (D) Backing up data

53. In an ER diagram an entity set that does not have sufficient attributes to form a primary key is marked as:
- (A) Weak entity (B) Strong entity
(C) Derived entity (D) Composite entity
54. An Index in a database is used to
- (A) Decrease storage Space (B) Increase data redundancy
(C) Speed up data retrieval (D) Secure the database
55. Which of the following is a benefit of query optimization in database ?
- (A) Reduces the need for indexes (B) Increase the complexity of queries
(C) Improve query performance (D) Decreases database security
56. Which of the following best describes the concept of “transaction isolation level” ?
- (A) The ability to execute SQL transactions in parallel
(B) The degree to which transaction changes are visible to other transactions
(C) The speed at which transactions are executed
(D) The security level applied to transactions
57. What mechanism is commonly used to ensure the durability of transactions in database systems?
- (A) Log based recovery (B) Two phase locking
(C) Timestamp ordering (D) Save points
58. In the context of concurrency control, what does the term “deadlock” refer to ?
- (A) A lock that cannot be released
(B) A transaction that can not be rolled back
(C) A Situation where transactions wait indefinitely for each other
(D) A failed concurrency control mechanism
59. What is a B - tree index suitable for?
- (A) Only equality searches (B) Only range searches
(C) Both equality and range searches (D) Neither equality nor range searches
60. In which of the following categories can white box testing be classified ?
- (A) Design based testing (B) Structural testing
(C) Both (A) and (B) (D) None of the above
61. When is the ‘risk analysis’ performed in Spiral model ?
- (A) In first loop (B) Before using the spiral model
(C) Every loop (D) None of the above
62. What is the availability of the software with following reliability figures
Mean Time Between Failure (MTBF) = 20 days
Mean Time to Repair (MTTR) = 20 hours
- (A) 90% (B) 96%
(C) 24% (D) 50%

63. The following portion of a DFD is not correct because



- (A) There are many data flow out of the process
 (B) There are no input data flows to the process
 (C) The output does not go to an external entity
 (D) There is no data source
64. A company has choice of two languages L_1 and L_2 to develop a software for their client. Number of LOC required to develop an application in L_2 is thrice the LOC in language L_1 . Also software has to maintain for 10 years. The Parameters of L_1 and L_2 are given below

Parameter	L 1	L 2
Man year needed for development	LOC/1000	LOC/1000
Development Cost	Rs. 70000	Rs. 90000
Cost of maintenance per year	Rs. 100000	Rs. 4000

Total cost of project includes cost of development and maintenance. What is the LOC for L_1 for which cost of developing software with both languages must be same?

- (A) 2000 (B) 6000
 (C) 3000 (D) 5000
65. Regression Testing is primarily related to
- (A) Functional Testing (B) Development Testing
 (C) Data flow Testing (D) Maintenance Testing
66. Which one of the following is not an approach to estimate the cost of the software
- (A) Heuristic (B) Empirical
 (C) Critical (D) Analytical
67. TCP is a _____ transport protocol
- (A) non reliable (B) reliable
 (C) effortless (D) best effort
68. A network designer wants to connect 5 routers as point-to-point simplex line. Then the total number of lines required would be
- (A) 5 (B) 10
 (C) 20 (D) 32
69. Error detection at the data link level is achieved by
- (A) Bit stutting (B) Cyclic Redundancy code
 (C) Hamming Code (D) Equalization

70. ARP (Address Resolution Protocol) is
- (A) Used to dynamically bind a high level IP address to low level physical address
 - (B) Used for transferring files from one machine to another
 - (C) Used to monitor computers
 - (D) Handles error and control messages
71. For a sliding window of size $n-1$ (n sequence number) there can be maximum of how many frames sent but yet to be acknowledged?
- (A) 0
 - (B) n
 - (C) $n - 1$
 - (D) $n + 1$
72. In RSA algorithm if $p = 7$ and $q = 3$ what will be $\phi(n)$ and n ?
- (A) 12, 21
 - (B) 21, 12
 - (C) 14, 18
 - (D) 18, 14
73. DES algorithm encrypts data in blocks of size
- (A) 16 bits
 - (B) 64 bits
 - (C) 32 bits
 - (D) none of the above
74. A proxy firewall filters at _____ layer
- (A) Physical
 - (B) Data link
 - (C) Network
 - (D) Application
75. What is the advantage of digital signing a hash instead of signing the entire data in RSA?
- (A) Time saving
 - (B) Security
 - (C) Time saving and computationally less expensive
 - (D) Secured and less time required
76. What is the correct syntax to write an HTML comment?
- (A) `<!-- comment -->`
 - (B) `// comment`
 - (C) `# comment`
 - (D) `/* comment */`
77. What is the select tag used for ?
- (A) create a combo box
 - (B) change text font
 - (C) both (A) and (B)
 - (D) none of the above
78. In XML, DTD stands for
- (A) Document Type Declaration
 - (B) Data Type Definition
 - (C) Document Type Definition
 - (D) Document To Declaration
79. SAX in XML is used for
- (A) Defining format of an XML document
 - (B) Validating XML file
 - (C) Parsing XML documents
 - (D) None of the above
80. What is Document Object Model (DOM) ?
- (A) coding style
 - (B) specification
 - (C) a parser
 - (D) none of the above

81. The eigen values of the following matrix

$$\begin{bmatrix} 10 & -4 \\ 18 & -12 \end{bmatrix}$$

(A) 4, 9

(B) 6, -8

(C) 4, 8

(D) -6, 8

82. The value of $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$ is

(A) $\ln 2$

(B) 1.0

(C) e

(D) ∞

83. A box contains 25 parts of which 10 are defective. Two parts are being drawn simultaneously in a random manner from the box. The Probability of both the parts being good is

(A) 7/20

(B) 42/125

(C) 25/29

(D) 5/9

84. Which one of the following is first order linear differential equation

(A) $\frac{dy}{dx} + xy = e^{-x}$

(B) $\frac{dy}{dx} + xy = e^{-y}$

(C) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

(D) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + y = \cos x$

85. The value of $\oint_c \frac{\sin z}{z} dz$, where the contour of the integration is a simple closed curve around the origin is

(A) 0

(B) $2\pi i$

(C) ∞

(D) $1/2\pi i$

86. The Newton - Raphson iteration $x_{n+1} = \frac{1}{2} \left(x_n + \frac{N}{x_n} \right)$ can be used to compute

(A) square root of N

(B) reciprocal of N

(C) Square of N

(D) logarithm of N

87. Given a system of equations

$$x + 2y + 2z = b_1$$

$$5x + y + 3z = b_2$$

Which of the following is true its solutions ?

(A) The system has unique solution for any given values of b_1 & b_2

(B) The system will have infinitely many solution for any values of b_1 & b_2

(C) Whether or not a solution exists depends on given b_1 & b_2

(D) The system would have no solution for any values of b_1 & b_2

88. The total derivative of the function xy is
 (A) $x dy + y dx$ (B) $x dx + y dy$
 (C) $dx + dy$ (D) $dx dy$
89. Consider a poisson distribution for the tossing of a biased coin. The mean for this distribution is μ . The standard deviation for this distribution is given by
 (A) $\sqrt{\mu}$ (B) μ^2
 (C) μ (D) $1/\mu$
90. The solution of the initial Value problem $\frac{dy}{dx} = 2xy; y(0) = 2$ is
 (A) $1 + e^{-x^2}$ (B) $2e^{-x^2}$
 (C) $1 + e^{x^2}$ (D) $2e^{x^2}$
91. $\oint \frac{z^2}{z^2 - 1} dz$ in the counterclockwise $|z - 1| = 1$ direction around $|z - 1| = 1$ is
 (A) $-\pi i$ (B) 0
 (C) πi (D) $2\pi i$
92. Numerical integration using trapezoidal rule gives the best result for a single variable function which is
 (A) Linear (B) parabolic
 (C) logarithmic (D) hyperbolic
93. Using Euler method Find $y(0.3)$, for $\frac{dy}{dx} = 2xy + 1; y(0) = 0$ with step size $h = 0.1$
 (A) 0.3101 (B) 0.3142
 (C) 0.6202 (D) 4.0800
94. For the function $\frac{\sin z}{z^3}$ of a complex variable Z , the point $Z = 0$ is
 (A) a pole of order 3 (B) a pole of order 2
 (C) a pole of order 1 (D) not a singularity
95. Laplace transform of $\cos wt = \frac{s}{s^2 + w^2}$ Then Laplace transform of $e^{-2t} \cos 4t$ is
 (A) $(S-2) / (S-2)^2 + 16$ (B) $(S+2) / (S-2)^2 + 16$
 (C) $(S-2) / (S+2)^2 + 16$ (D) $(S+2) / (S+2)^2 + 16$
96. Consider the data set 14, 18, 14, 14, 10, 29, 33, 31, 25. If you add 20 to each of the values then
 (A) both mean and Variance change
 (B) both mean and Variance unchanged
 (C) the mean is unchanged, variance changes
 (D) the mean is changed, the variance is unchanged

97. The function $f(x) = 2x^3 - 3x^2 - 36x + 2$ has its maxima at
 (A) $x = -2$ only (B) $x = 0$ only
 (C) $x = 3$ only (D) both $x = -2$ and $x = 3$
98. The sum of Eigen values of the matrix

$$A = \begin{bmatrix} 215 & 650 & 795 \\ 655 & 150 & 835 \\ 485 & 355 & 550 \end{bmatrix}$$

 (A) 915 (B) 1355
 (C) 1640 (D) 2180
99. Divergence of the vector field $x^2z \bar{i} + xy \bar{j} - yz^2 \bar{k}$ at $(1, -1, 1)$ is
 (A) 0 (B) 3
 (C) 5 (D) 6
100. The partial differential equation $\frac{\partial y}{\partial t} = \infty \frac{\partial^2 y}{\partial x^2}$ where ∞ is a positive constant, is
 (A) Circular (B) Parabolic
 (C) Elliptic (D) Hyperbolic

