QP Series Code : **BA**

অসম দক্ষতা বিশ্ববিদ্যালয়

ASSAM SKILL UNIVERSITY

(A Govt of Assam University)

Assam Skill University Entrance Examinations 2026

M.TECH IN INFORMATION TECHNOLOGY (AI-ML)

(Paper No. : 12)

Full Marks : 100 Time : 130 minutes

Total number of pages in this booklet : 12

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE INSTRUCTED

All candidates are required to read the instructions given below, before starting to write the answers. Ensure to write your ROLL CODE AND ROLL NUMBER AT THE BOTTOM OF THIS PAGE.

Instructions

1. Candidate should keep his/her admit card on the table with his/her latest photograph pasted on it.
2. There are 100 MCQs meant for applicants **for admission in M.Tech. in IT (Specialization in AI_ML)**. All questions are compulsory. MCQs are as per the given syllabus.
3. Each question carries 1 mark. There is no negative marking. **Full marks : 100**.
4. The answers are to be given by making proper marking on the **OMR with ball point Black pen** only in separate OMR sheets.
5. No loose sheet is allowed. Rough work, if required, may be done on the blank pages at the end of this question paper.
6. Talking with any other candidate inside the examination hall may lead to disqualification of the candidate.
7. **OMRs must to be signed by the candidate and the invigilator**. **The candidate has to ensure the same, because lack of these signatures will lead to cancellation of the OMR.**
8. Candidate has to put his/her signature on the attendance sheet. **No candidate is allowed to leave the examination hall before completion of 1 (one) hour from the commencement of examination.**
9. Candidate needs to check the Question booklet after instructed by the invigilator and report if any discrepancies are noticed in the booklet regarding number of pages or damaged pages.
10. **Marking in more than one option against any question on the OMR will cancel that answer**. Instructions are given on the reverse of the OMRs.
11. **Correct Roll Codes is to be written on the concerned OMR**.
12. Handover the Question Paper and the OMR to the invigilator before leaving the exam hall.

Roll Code : | M | I | T | Roll Number : | | | | | | | |

Sl. No. of the OMR : | | | | | | | | Signature of the candidate:.....

M.TECH

Information Technology

1. If a proposition p is False and a proposition q is True, what is the truth value of the conditional statement $p \rightarrow q$ (if p, then q)?

(A) True (B) False

(C) Indeterminate (D) Alternates between True and False

2. Let $A = \{1, 2, 3\}$ and $B = \{4, 5\}$. Which of the following sets of ordered pairs defines a valid function from A to B?

(A) {(1,4),(2,5)} (B) {(1,4),(2,4),(3,5)}

(C) {(1,4),(1,5),(2,4),(3,5)} (D) {(1, 5), (2, 5), (3, 6)}

3. A connected planar graph has 10 vertices and 15 edges. According to Euler's formula for planar graphs, how many regions (faces) does this graph divide the plane into?

(A) 5 (B) 6

(C) 7 (D) 8

4. What is the solution to the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2}$ for $n \geq 2$, given the initial conditions $a_0 = 1$ and $a_1 = 5$?

(A) $a_n = 2^n + 3^n$ (B) $a_n = 3(2^n) - 2(3^n)$

(C) $a_n = 3^n - 2^n$ (D) $a_n = 3(3^n) - 2(2^n)$

5. If a 3×3 matrix A has eigenvalues $\lambda_1 = 1$, $\lambda_2 = 2$, and $\lambda_3 = 5$, what is the determinant of the matrix A^2?

(A) 10 (B) 25

(C) 100 (D) 8

6. Under what condition does a system of linear equations $Ax = b$ (where A is an $m \times n$ matrix) have an infinite number of solutions?

(A) rank (A) = rank ($[A \mid b]$) = n (B) rank (A) = rank ($[A \mid b]$) < n

(C) rank (A) ≠ rank ($[A \mid b]$) (D) rank (A) > rank ($[A \mid b]$)

7. Evaluate the limit: $lim_{x \to 0} \frac{e^{2x} - 1}{sin(3x)}$.

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) 1 (D) $\frac{3}{2}$

8. Find the minimum value of the function $f(x) = x^2 - 4x + 7$ on the real line.

(A) 2 (B) 3

(C) 4 (D) 7

9. The Mean Value Theorem states that if a function f is continuous on $[a, b]$ and differentiable on (a, b), there exists *at least one* $c \in (a, b)$ such that $f'(c) = \frac{f(b) - f(a)}{b - a}$. For $f(x) = x^2$ on the interval $[1, 3]$, find the value of c.

(A) 1.5 (B) 2.0

(C) 2.5 (D) 3.0

10. A laboratory blood test is 99% effective in detecting a certain disease when it is, in fact, present. However, the test yields a "false positive" result for 1% of the healthy persons tested. If 0.5% of the population actually has the disease, what is the probability that a person has the disease given that their test result is positive?

(A) 0.332 (B) 0.500

(C) 0.990 (D) 0.005

11. Which law states $(A + A = A)$?

(A) Commutative Law (B) Idempotent Law

(C) Associative Law (D) Distributive Law

12. The binary equivalent of decimal 25 is:

(A) 11001 (B) 10101

(C) 11100 (D) 10011

13. A half adder has:

(A) 1 input, 2 outputs (B) 2 inputs, 1 output

(C) 2 inputs, 2 outputs (D) 3 inputs, 2 outputs

14. Which flip-flop has no invalid state?

(A) SR (B) JK

(C) D (D) T

15. The 2's complement of 1010 is (4-bit representation):

(A) 0110 (B) 0101

(C) 1011 (D) 1110

16. Karnaugh map is used for:

(A) Encoding (B) Minimization

(C) Multiplexing (D) Memory allocation

17. Floating-point representation is mainly used for:

(A) Integers only (B) Real numbers

(C) Characters (D) Logic values

18. A multiplexer with 8 inputs requires how many select lines?

(A) 2 (B) 3

(C) 4 (D) 8

19. Gray code is useful because:

(A) It reduces memory (B) Adjacent numbers differ by one bit

(C) It is faster (D) It uses fewer bits

20. Which gate is called universal gate?

(A) XOR (B) NOR

(C) AND (D) OR

21. DMA stands for:

(A) Direct Memory Access (B) Data Memory Allocation

(C) Dynamic Memory Access (D) Direct Machine Access

22. Pipeline hazard due to resource conflict is:

(A) Data hazard (B) Structural hazard

(C) Control hazard (D) Memory hazard

23. Cache memory is placed between:

(A) CPU and RAM (B) RAM and Disk

(C) CPU and Disk (D) Registers and ALU

24. Which addressing mode uses operand value directly?

(A) Immediate (B) Direct

(C) Indirect (D) Indexed

25. ALU performs:

(A) Input operations (B) Arithmetic and logical operations

(C) Memory allocation (D) File handling

26. The fastest memory is:

(A) Cache (B) Register

(C) RAM (D) ROM

27. Interrupts are used for:

(A) Program termination (B) Efficient I/O handling

(C) Data encryption (D) Address translation

28. Main memory is usually:

(A) SRAM (B) DRAM

(C) ROM (D) Flash

29. Instruction pipelining improves:

(A) Latency (B) Throughput

(C) Memory size (D) Program size

30. Which memory is non-volatile?

(A) RAM (B) Cache

(C) ROM (D) Register

31. Which data structure follows LIFO?

(A) Queue (B) Stack

(C) Linked List (D) Tree

32. Recursion requires:

(A) Queue (B) Heap

(C) Stack (D) Graph

33. The root of a binary tree has:

(A) No children (B) No parent

(C) Two parents (D) One child only

34. Worst-case search time in an unsorted array is:

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

(C) $O(n)$ (D) $O(n^2)$

35. A queue follows:

(A) LIFO (B) FIFO

(C) FILO (D) Random access

36. Which traversal visits left-root-right?

(A) Preorder (B) Postorder

(C) Inorder (D) Level order

37. Binary search requires:

(A) Linked list (B) Sorted data

(C) Heap (D) Tree

38. Dynamic memory allocation in C uses:

(A) scanf() (B) malloc()

(C) printf() (D) sizeof()

39. A graph with no cycles is called:

(A) Complete graph (B) Tree

(C) Directed graph (D) Weighted graph

40. Heap is mainly used for:

(A) Searching (B) Sorting

(C) File indexing (D) Encryption

41. Merge sort is based on which design technique?

(A) Greedy (B) Divide and conquer

(C) Dynamic programming (D) Backtracking

42. Time complexity of binary search is:

(A) $O(n)$ (B) $O(\log n)$

(C) $O(n^2)$ (D) $O(1)$

43. Which algorithm is used for shortest path?

(A) Kruskal (B) Dijkstra

(C) DFS (D) Prim

44. Asymptotic notation for upper bound is:

(A) Ω (B) Θ

(C) O (D) α

45. Prim's algorithm finds:

(A) Shortest path (B) MST

(C) Sorting (D) Searching

46. Hash tables provides average-case search complexity of:

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

(C) $O(n)$ (D) $O(n^2)$

47. DFS uses:

(A) Queue (B) Stack

(C) Heap (D) Array

48. Which is a greedy algorithm?

(A) Merge sort (B) Kruskal's

(C) Floyd-Warshall (D) Binary search

49. Bubble sort worst-case complexity is:

(A) $O(n)$ (B) $O(\log n)$

(C) $O(n^2)$ (D) $O(n \log n)$

50. Dynamic programming avoids:

(A) Sorting (B) Repetition of subproblems

(C) Memory use (D) Recursion

51. DFA stands for:

(A) Dynamic Finite Automata (B) Deterministic Finite Automata

(C) Direct Finite Automata (D) Defined Finite Automata

52. Regular expressions are used to describe:

(A) Context-free languages (B) Regular languages

(C) Recursive languages (D) Turing machines

53. PDA recognizes:

(A) Regular languages (B) Context-free languages

(C) Recursive languages (D) Unrestricted languages

54. Pumping lemma is used to prove:

(A) Regularity (B) Non-regularity

(C) Decidability (D) Parsing

55. Turing machine is characterized by:

(A) Infinite tape (B) Finite tape

(C) No memory (D) Stack only

56. Which grammar generates context-free languages?

(A) Type-0 (B) Type-1

(C) Type-2 (D) Type-3

57. The language accepted by DFA is:

(A) Recursive enumerable (B) Regular

(C) Context-sensitive (D) Context-free

58. Halting problem is:

(A) Decidable (B) Undecidable

(C) NP-complete (D) Regular

59. NFA can be converted to:

(A) PDA (B) DFA

(C) TM (D) Grammar

60. Chomsky hierarchy classifies:

(A) Algorithms (B) Languages

(C) Memories (D) Compilers

61. Lexical analysis produces:

(A) Parse tree (B) Tokens

(C) Machine code (D) Symbol table

62. Syntax analysis is also called:

(A) Scanning (B) Parsing

(C) Optimization (D) Linking

63. Intermediate code generation is done after:

(A) Execution (B) Parsing

(C) Linking (D) Loading

64. Symbol table stores:

(A) Machine code (B) Variable information

(C) Parse tree (D) Errors only

65. Common subexpression elimination is a:

(A) Parsing method (B) Optimization technique

(C) Runtime method (D) Lexical process

66. Constant propagation is performed using:

(A) Data-flow analysis (B) Parsing algorithm

(C) Code generation method (D) Storage method

67. Which phase removes comments?

(A) Syntax analysis (B) Lexical analysis

(C) Code optimization (D) Linking

68. Parse tree is generated during:

(A) Lexical analysis (B) Syntax analysis

(C) Code generation (D) Execution

69. Runtime environment manages:

(A) Source code (B) Memory allocation

(C) Parsing (D) Lexical tokens

70. Liveness analysis helps in:

(A) Register allocation (B) Token generation

(C) Parsing (D) Linking

71. Inter-process communication is commonly called:

(A) IPC (B) DMA

(C) FIFO (D) DFS

72. Deadlock requires how many necessary conditions?

(A) 2 (B) 3

(C) 4 (D) 5

73. Virtual memory uses:

(A) Paging (B) Compilation

(C) Parsing (D) Sorting

74. Round Robin is a:

(A) Memory allocation technique (B) CPU scheduling algorithm

(C) File system (D) Deadlock prevention

75. Semaphore is used for:

(A) Scheduling (B) Synchronization

(C) Paging (D) File access

76. Which scheduling minimizes average waiting time?

(A) FCFS (B) SJF

(C) Round Robin (D) Priority

77. A thread is:

(A) Heavyweight process (B) Lightweight process

(C) File system (D) Deadlock state

78. Page fault occurs when:

(A) CPU fails (B) Required page is not in memory

(C) Disk crashes (D) File deleted

79. Mutual exclusion is needed in:

(A) Deadlock (B) Synchronization

(C) Paging (D) Scheduling

80. File system manages:

(A) CPU (B) Memory

(C) Storage organization (D) Network

81. SQL stands for:

(A) Structured Query Language (B) Sequential Query Logic

(C) System Query Language (D) Standard Question Language

82. Primary key must be:

(A) Null (B) Unique

(C) Duplicate (D) Optional

83. ER model is used for:

(A) Query optimization (B) Database design

(C) Indexing (D) Transactions

84. BCNF is related to:

(A) Transactions (B) Normalization

(C) Indexing (D) SQL commands

85. B+ tree is mainly used for:

(A) Sorting (B) Indexing

(C) Parsing (D) Encryption

86. COMMIT command is used to:

(A) Undo changes (B) Save transaction

(C) Delete table (D) Lock database

87. Relational algebra is:

(A) Procedural (B) Non-procedural

(C) Object-oriented (D) Recursive

88. A foreign key ensures:

(A) Integrity constraint (B) Sorting

(C) Indexing (D) Backup

89. Deadlock in DBMS occurs due to:

(A) Concurrency (B) Sorting

(C) Parsing (D) Indexing

90. Third normal form removes:

(A) Partial dependency (B) Transitive dependency

(C) Repetition (D) Redundancy only

91. In a standard TCP/IP model, how many layers are there?

(A) 3 (B) 4

(C) 5 (D) 7

92. HTTP belongs to:

(A) Transport layer (B) Application layer

(C) Network layer (D) Data link layer

93. ARP is used for:

(A) Error detection (B) Address resolution

(C) Routing (D) Congestion control

94. Which protocol is connectionless?

(A) TCP (B) UDP

(C) FTP (D) SMTP

95. CIDR is related to:

(A) Routing (B) IP addressing

(C) Encryption (D) Framing

96. DNS translates:

(A) IP to MAC (B) Domain names to IP addresses

(C) Data to packets (D) Files to emails

97. Ethernet works at:

(A) Physical layer only (B) Data link layer

(C) Network layer (D) Application layer

98. ICMP is mainly used for:

(A) Error reporting (B) File transfer

(C) Email (D) Web browsing

99. TCP provides:

(A) Unreliable delivery (B) Reliable delivery

(C) No flow control (D) No congestion control

100. NAT is used to:

(A) Encrypt packets

(B) Translate private and public IP addresses

(C) Detect errors

(D) Manage files

SPACE FOR ROUGH WORK (IF REQUIRED)