Code No.	V – 2363

Entrance Examination for Admission to the M.Tech. Courses in the Teaching Departments, 2025

CSS

COMPUTER SCIENCE WITH SPECIALIZATION IN DIGITAL IMAGE COMPUTING

For office use only

General Instructions

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be (✓) 'tick marked' **only** in the "**Response Sheet**" provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

Time : 2 Hours **Max. Marks : 100**

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

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Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. If $|A_{n\times n}| = 5$ and $|adj\ A| = 625,$, what is the value of n.
   A. 3
   B. 4
   C. 5
   D. 6

DO NOT WRITE HERE

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2. The matrix $\begin{bmatrix} 1 & a \\ 6 & 5 \end{bmatrix}$ (where a>0) has a negative eigen value if a is greater than

A. 1/5 B. 1/6

C. 6/5 D. 5/6

3. $A = \begin{bmatrix} 2 & 4 & 3 \\ 5 & 1 & 6 \\ 8 & 7 & 9 \end{bmatrix}$ The trace of the matrix A is _____

A. 12 B. 24

C. 36 D. 48

4. The minimum value of $2x^2 + 4x + 10$ is

A. 4 B. 6

C. 8 D. 10

5. The value of $\lim_{x \to 0} \frac{2x^4 - \sin(x)}{x}$ is

A. –1
B. 0
C. 1
D. None of the above

6. One card is drawn at random from a pack of 52 cards. What is the probability that the card is either red or king?

A. 1/7
B. 1/13
C. 7/13
D. None of the above

7. In a box, there are 10 red, 20 blue, and 30 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

A. 1/3
B. 1/6
C. 2/3
D. None of the above

8. The technique used to check quantitatively whether the given data distribution is close to Gaussian distribution is

A. Chi-square test
B. Curve fitting
C. Standard deviation of mean
D. None of the above

9. Choose the correct choice regarding the following propositional logic assertion $X : ((R \wedge S) \rightarrow T) \rightarrow ((R \wedge S) \rightarrow (S \rightarrow T))$

A. X is a tautology
B. X is a contradiction
C. X is neither a tautology nor a contradiction
D. Antecedent and consequent of X is not logically equivalent

10. What is logically equivalent to the following statements? “I pass only if you pass” (fail is equivalent to not pass)

A. You fail if I pass
B. You pass only if I pass
C. If you pass then I pass
D. If you fail then I fail

11. The function $f(x) = x^2 + 2x + 2$ is

A. Periodic
B. Odd
C. Even
D. Neither odd nor even

12. Let A = {2, 4, 6, 8, 10}. Then the number of subsets of A containing exactly two elements is

A. 5 B. 10

C. 20 D. 40

13. Any group of order 3 is

A. Cyclic and abelian

B. Cyclic but not abelian

C. Infinite cyclic group

D. None of the above

14. What is the sum of first 10 terms of an arithmetic progression if the first terms is 13 and last term is 37?

A. 125 B. 250

C. 170 D. 230

15. The Boolean function $PQ + PR$ is equivalent to

A. $PQR + P'QR + Q'R'$ B. $PQ + PR + QR$

C. $PQR + PQR' + PQ'R$ D. None

16. Identify the incorrect Boolean algebra expression from the options below?

A. $\overline{ABC} + BC + AC = \overline{A} + C$

B. $(A + B)\left[\overline{A}\left(\overline{B} + \overline{C}\right)\right] + \overline{B}\,\overline{C} + \overline{A}\,\overline{C} = A + \overline{C} + B$

C. $AB + \overline{A}C + BC = AB + \overline{A}C$

D. $AB + A\overline{C} = B$

17. How many full adders and half adders are needed to add two 16-bit numbers?

A. 8 half adders, 8 full adders

B. 1 half adders, 15 full adders

C. 16 half adders, 0 full adders

D. 4 half adders, 12 full adders

18. Which of the following flip-flop designs inherently prevents the race around problem due to its architecture?

A. D flip-flop B. T flip-flop

C. S-R flip-flop D. Master-slave J-K flip-flop

19. Convert the hexadecimal value A0 to its decimal equivalent

A. 80
B. 256
C. 100
D. 160

20. The device which converts *BCD* to seven segment, is called

A. Encoder
B. Decoder
C. Multiplexer
D. Demultiplexer

21. Which of the following is the correct binary representation of the decimal number 365?

A. 101101101
B. 101110101
C. 101100101
D. 101111101

22. What is the minimized form of the Boolean expression AB+A'B+A'BC

A. B
B. $AB+CAB+CAB+C$
C. $B+CB+CB+C$
D. $B+ACB+ACB+AC$

23. Which combination of logic gates is needed to decode the binary input 0110?

A. One 4-input NAND gate
B. One 4-input AND gate, one inverter
C. Two 2-input AND gates and one OR gate
D. One 4-input AND gate, two inverters

24. The sum of 101, 101, 11.011, and 10.100 in decimal is:

A. 12.25
B. 11.50
C. 13.40
D. 14.65

25. What is the 2's complement of the sum of the binary numbers 101101 and 011011?

A. 0110111
B. 0111000
C. 1001000
D. 1001100

26. Find the preorder traversal of a tree if the inorder traversal of the tree is E, A, C, K, F, H, D, B, G.

A. FAEKCDBHG
B. EAFKHDCBG
C. FAEKCDHGB
D. FEAKDCHBG

27. Which of the following sorting algorithm uses the concept of divide and conquer?

A. Bubble sort
B. Quick sort
C. Insertion sort
D. All of the above

28. Which data structure is used for performing Breadth First Traversal on a graph?

A. Tree
B. Queue
C. Array
D. Stack

29. Consider that a node in a Binary Search Tree has two children ,then it's in order predecessor has

A. No left child
B. Two children
C. No right child
D. No child

30. Find the correct big-*O* expression for $1+2+3+...+n^2$?

A. $O(\log n)$
B. $O(n^2)$
C. $O(n \log n)$
D. $O(n)$

31. Which of the following searching technique takes $O(1)$ time to find a data?

A. Hashing
B. Linear Search
C. Binary Search
D. Tree Search

32. What is the output if the following program?

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

A. 5
B. 6
C. 0, 1, 2, 3, 4, 5
D. 1, 2, 3, 4

33. Find the output of the following program:

```
main( )
{
 int a=4;
 change(a);
 print("%d",a);
}
change( )
{
mt a;
printf("%d",++a);
}
```

A. 45
B. 55
C. 44
D. 54

34. Given a class named Book, which of the following is not a valid constructor?

A. Book( ){ }
B. Book (Book b){ }
C. Book (Book &b){ }
D. Book (char* author, char* title) { }

35. Exception handling is targeted at

A. Run-time error
B. Logical error
C. Compile-time error
D. All of these

36. Which is the best form of coupling?
    A. Tight
    B. Loose
    C. Free
    D. Complete

37. Which among the following will be used to define a block in a python code?
    A. Key
    B. Brackets
    C. Indentation
    D. All of the above

38. What is the output of the following code?
    for i in [1, 2, 3, 4][::–1]:
    print(i, end=‘ ’)
    A. 4321
    B. Error
    C. 1234
    D. none of the mentioned

39. What is the use of continue statement in python?
    A. For terminating the loop
    B. To end the program
    C. To skip the loop entirely
    D. Skips the current iteration and continues to the next one.

40. What is the output of the following python code?
    for i in range(2, 10, 2):
    print(i)
    A. 2 4 6 8
    B. 1 3 5 7 9
    C. 2 4 6 8 1 0
    D. 2 4 6

41. Data path
    A. Is the pathway that the control structures takes through the printer
    B. Is the pathway that the instructions takes through the cache memory
    C. Is the pathway that the data takes through the microprocessor
    D. None of the above

42. Identify the addressing mode used in the instruction LDA 0345 H.
    A. Direct
    B. Induced
    C. Indirect
    D. Immediate

43. TRAP instruction is _____ whereas RST 7.5 is a _____ instruction
    A. Maskable, maskable
    B. Non-maskable, non-maskable
    C. Maskable, non-maskable
    D. Non-maskable, maskable

44. Which of the following memory is used to increase the speed of processing in a computer
    A. Cache memory
    B. RAM
    C. ROM
    D. All of the above

45. The situation wherein the data of operands are not available is called
    A. Data hazard
    B. Stock
    C. Deadlock
    D. Structural hazard

46. Which is the addressing mode were you directly specify the operand value?
    A. Immediate
    B. Definite
    C. Relative
    D. Direct

47. The bus will be available when DMA controller receives which of the following signal
    A. HLDA
    B. DACK
    C. HRQ
    D. All of the mentioned

48. The IOR (active low) input line acts as output in
    A. slave mode
    B. master mode
    C. master and slave mode
    D. none of the mentioned

49. The instruction IOWR (active low) performs.
    A. Write Operation on input data
    B. Write Operation on output data
    C. Read Operation on input data
    D. Read Operation on output data

50. When data transmission occurs in both directions, but only one direction at a time, it is of
    A. Simplex Mode
    B. Duplex Mode
    C. Semi Duplex Mode
    D. Half Duplex Mode

51. The number of trivial substrings in “Exam2025” are:

A. 2
B. 36
C. 37
D. None of the above

52. A minimal DFA that is equivalent to a NDFA has:

A. Exactly 2^n states
B. Exactly $2n$ states
C. Always more states
D. Sometimes more states

53. $S \rightarrow PQ$

$P \rightarrow QQ \mid 0$

$Q \rightarrow PQ \mid 1$

Choose incorrect statement?

A. 00111 can be derived from above grammar
B. 0011 can be derived from above grammar
C. 010101 can be derived from above grammar
D. 0111 can be derived from above grammar

54. The complement of CFL:

A. Recursive
B. Recursive enumerated
C. Not recursive enumerated
D. None of the above

55. Consider the following regular expressions:

$r_1 = q(p + q)^*$

$r_2 = q(q + p)^+$

$r_3 = qq^*p$

Which of the following is true?

A. $L(r_1) \subseteq L(r_2)$ and $L(r_1) \subseteq L(r_3)$
B. $L(r_1) \supseteq L(r_2)$ and $L(r_2) \supseteq L(r_3)$
C. $L(r_1) \supseteq L(r_2)$ and $L(r_2) \subseteq L(r_3)$
D. $L(r_1) \subseteq L(r_3)$ and $L(r_2) \subseteq L(r_1)$

56. If $L_1 = \{0^m \mid m \geq 0\}$ and $L_2 = \{1^m \mid m \geq 0\}$ then $L_1 \cdot L_2 =$ _____.

A. $\{0^m 1^m, m \geq 0\}$
B. $\{0^m 1^n, m, n \geq 0\}$
C. $\{0^m 1^n, m, n \geq 1\}$
D. None of the above

57. Suppose there exist a NPDA of Language L. Then
    A. There always exist a DPDA for L
    B. There doesn't exist a DPDA for L
    C. There may or may not exist a DPDA for L
    D. None of the above

58. The difference between LR(0) and SLR(1) is:
    A. Differs in both shift and reduce entries
    B. Differs only in shift entries
    C. Differs only in reduce entries
    D. Both are same

59. Consider the following grammar:
    $S \rightarrow S(S) \mid \in$
    Which one of the following is true
    I. Grammar is ambiguous
    II. Grammar is unambiguous
    III. Grammar will generate all strings having balanced parenthesis
    A. Only I
    B. Only II
    C. I and II
    D. I and III

60. Cross-compiler is a compiler
    A. Which is written in a language that is different from the source language
    B. That runs on one machine but produces object code for another machine
    C. That generates object code for its last machine
    D. Which is written in a language that is same as the source language

61. How an entity set is represented in an ER diagram?
    A. Ellipse
    B. Rectangle
    C. Diamond box
    D. Circle

62. Which normal form is used to eliminate transitive dependencies in a relational database?
    A. 1NF
    B. 2NF
    C. 3NF
    D. BCNF

63. Which of the following statements is true about B+ Trees?
    A. Internal nodes store actual data
    B. Leaf nodes do not contain pointers
    C. All data is stored at leaf nodes
    D. B+ Trees are unordered

64. Which structure ensures that all leaf nodes are at the same level?
    A. B Tree
    B. B+ Tree
    C. AVL tree
    D. Binary Search Tree

65. Which of the following methods is used for optimistic concurrency control?
    A. Validation based
    B. Timestamp ordering
    C. Lock based
    D. None of these

66. Which of the following ensures atomicity in a transaction?
    A. Lock
    B. Rollback
    C. Commit
    D. Log file

67. Which of the following refers to one or more attributes that, when combined, can uniquely identify a record in a table?
    A. Primary Key
    B. Foreign Key
    C. Super Key
    D. Candidate Key

68. In relational algebra, which symbol is used to represent the assignment operation'?
    A. =
    B. =+
    C. ==
    D. ←

69. What type of relationship is formed when a primary key is combined with a foreign key?
    A. Parent-Child relationship between the connected tables
    B. Many-to-Many relationship between the connected tables
    C. Network model between the connected tables
    D. None of the above

70. Which of the following is a comparison operator in SQL?
    A. =
    B. LIKE
    C. BETWEEN
    D. All of the above

71. In a fully connected mesh topology, how many direct physical links are required to connect n devices?

A. $n(n-1)/2$ B. $(n-1)/2$

C. n D. $n-1$

72. Which of the following communication technologies are commonly used in the operation of a Wide Area Network (WAN)?

A. Telephone lines B. Microwaves

C. Satellites D. All of these

73. Which of the following IP addresses belong to class B

A. 125.123.123.2 B. 191.23.21.54

C. 192.128.32.56 D. 10.14.12.34

74. How does Network Address Translation (NAT) contribute to improving network security?

A. It encrypts all outgoing data packets

B. It conceals private IP addresses from external networks

C. It completely restricts all incoming traffic

D. It assigns a distinct public IP address to each internal device

75. Which port number is commonly used for FTP data transfer in active mode?

A. 20 B. 21

C. 22 D. 80

76. What is the primary function of the Domain Name System (DNS)?

A. Translate domain names to IP addresses

B. Encrypt internet traffic for security

C. Establish direct peer-to-peer connections

D. Allocate IP addresses to network devices

77. In distance vector routing, each router receives vectors from

A. Every router in the network

B. Every router less than two units away

C. A table stored by the software

D. Its neighbours only

78. Which protocol is used for communication between email servers?
    A. FTP
    B. SMTP
    C. SNMP
    D. POP3

79. The cost of network is usually determined by
    A. Time complexity
    B. Switching complexity
    C. Circuit complexity
    D. none

80. Which of the following transmission media is used in bluetooth technology
    A. Radio links
    B. Microwave links
    C. VSAT communications
    D. Fiber optic

81. What does the exec( ) system call do?
    A. Creates a new process
    B. Replaces the current process image with a new one
    C. Allocates memory dynamically
    D. Terminates the current process

82. What is the process of loading an operating system from secondary memory to primary memory called?
    A. Compiling
    B. Booting
    C. Refreshing
    D. reassembling

83. Which software is used to create a job queue?
    A. Linkage editor
    B. Interpreter
    C. Driver
    D. Spooler

84. Which of the following is used to prevent race conditions in multithreading?
    A. Mutual exclusion
    B. Paging
    C. Fragmentation
    D. Swapping

85. Thrashing can be avoided by reducing
    A. Page frames
    B. CPU throughput
    C. Page faults
    D. None of these

86. Which directory structure allows a file to exist in multiple directories using links?
    A. Single-level directory
    B. Two-level directory
    C. Tree-structured directory
    D. Acyclic graph directory

87. In variable partition memory management, compaction results in:
    A. Reduction of fragmentation
    B. Minimal wastage
    C. Segment sharing
    D. None of the above

88. If a program's size is greater than the available RAM, execution is still possible if the OS supports:
    A. Multitasking
    B. Virtual memory
    C. Cache
    D. Secondary memory

89. Which of the following is used to manage concurrency and avoid race conditions in an operating system?
    A. Semaphore
    B. Deadlock Detection Algorithm
    C. Page Replacement Algorithm
    D. Virtual Memory

90. Which of the following is NOT a necessary condition for a deadlock to occur?
    A. Mutual Exclusion
    B. Hold and Wait
    C. Starvation
    D. Circular Wait

91. Which of the following is not required for Top-Down Design?
    A. Loop invariants
    B. Modularity
    C. Stepwise refinement
    D. Flow charting

92. In data flow diagrams, an originator or receiver of the data is represented by:
    A. An arrow
    B. A circle
    C. A square box
    D. A rectangle

93. How does rapid prototyping validate the quality of a design?
    A. Having a program simulate the real system
    B. Having the system analyst present an overview of design users
    C. Having data flow diagrams
    D. Both (A) and (B)

94. Functional cohesion means that
    A. Operation are part of single functional task and are placed in same procedures
    B. Operation are part of single functional task and are placed in multiple procedures
    C. Operations are part of multiple tasks
    D. None of the above

95. The approach to software testing is to design test cases to
    A. Break the software
    B. Understand the software
    C. Analyse the design of sub process in the software
    D. Analyse the output of the software

96. In an access matrix, the rows typically represent:
    A. Objects
    B. Files
    C. Subjects
    D. Access rights

97. Which of these is a type of program threat that replicates itself?
    A. Worm
    B. Logic bomb
    C. Keylogger
    D. Spyware

98. Which algorithm is symmetric?
    A. RSA
    B. DES
    C. ECC
    D. Diffie-Hellman

99. What is the full form of the acronym CHAP?
    A. Circuit Handshake Authentication Protocols
    B. Challenge Handshake Authentication Protocols
    C. Circuit Hardware Authentication Protocols
    D. Challenge Hardware Authentication Protocols

100. What is one of the main advantages of using Elliptic Curve Cryptography (ECC)?
    A. It uses longer keys for more security
    B. It is symmetric
    C. it is less secure than RSA
    D. It is faster due to smaller key sizes

RESPONSE SHEET

1	A	B	C	D	E	26	A	B	C	D	E	51	A	B	C	D	E	76	A	B	C	D	E
2	A	B	C	D	E	27	A	B	C	D	E	52	A	B	C	D	E	77	A	B	C	D	E
3	A	B	C	D	E	28	A	B	C	D	E	53	A	B	C	D	E	78	A	B	C	D	E
4	A	B	C	D	E	29	A	B	C	D	E	54	A	B	C	D	E	79	A	B	C	D	E
5	A	B	C	D	E	30	A	B	C	D	E	55	A	B	C	D	E	80	A	B	C	D	E
6	A	B	C	D	E	31	A	B	C	D	E	56	A	B	C	D	E	81	A	B	C	D	E
7	A	B	C	D	E	32	A	B	C	D	E	57	A	B	C	D	E	82	A	B	C	D	E
8	A	B	C	D	E	33	A	B	C	D	E	58	A	B	C	D	E	83	A	B	C	D	E
9	A	B	C	D	E	34	A	B	C	D	E	59	A	B	C	D	E	84	A	B	C	D	E
10	A	B	C	D	E	35	A	B	C	D	E	60	A	B	C	D	E	85	A	B	C	D	E
11	A	B	C	D	E	36	A	B	C	D	E	61	A	B	C	D	E	86	A	B	C	D	E
12	A	B	C	D	E	37	A	B	C	D	E	62	A	B	C	D	E	87	A	B	C	D	E
13	A	B	C	D	E	38	A	B	C	D	E	63	A	B	C	D	E	88	A	B	C	D	E
14	A	B	C	D	E	39	A	B	C	D	E	64	A	B	C	D	E	89	A	B	C	D	E
15	A	B	C	D	E	40	A	B	C	D	E	65	A	B	C	D	E	90	A	B	C	D	E
16	A	B	C	D	E	41	A	B	C	D	E	66	A	B	C	D	E	91	A	B	C	D	E
17	A	B	C	D	E	42	A	B	C	D	E	67	A	B	C	D	E	92	A	B	C	D	E
18	A	B	C	D	E	43	A	B	C	D	E	68	A	B	C	D	E	93	A	B	C	D	E
19	A	B	C	D	E	44	A	B	C	D	E	69	A	B	C	D	E	94	A	B	C	D	E
20	A	B	C	D	E	45	A	B	C	D	E	70	A	B	C	D	E	95	A	B	C	D	E
21	A	B	C	D	E	46	A	B	C	D	E	71	A	B	C	D	E	96	A	B	C	D	E
22	A	B	C	D	E	47	A	B	C	D	E	72	A	B	C	D	E	97	A	B	C	D	E
23	A	B	C	D	E	48	A	B	C	D	E	73	A	B	C	D	E	98	A	B	C	D	E
24	A	B	C	D	E	49	A	B	C	D	E	74	A	B	C	D	E	99	A	B	C	D	E
25	A	B	C	D	E	50	A	B	C	D	E	75	A	B	C	D	E	100	A	B	C	D	E

ROUGH WORK

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ROUGH WORK