

T.B.C. : 22/15/ET

Booklet Sr. No. ....0131.....

**TEST BOOKLET**  
**COMPUTER SCIENCE AND APPLICATIONS**  
**PAPER III**

Time Allowed : 2½ Hours]

[Maximum Marks : 150

*All questions carry equal marks.*

**INSTRUCTIONS**

1. Write your Roll Number only in the box provided alongside.   
Do not write anything else on the Test Booklet.
2. This Test Booklet contains 75 items (questions). Each item comprises four responses (answers). Choose only one response for each item which you consider the best.
3. After the candidate has read each item in the Test Booklet and decided which of the given responses is correct or the best, he has to mark the circle containing the letter of the selected response by blackening it completely with ball point pen as shown below. *H.B. Pencil should not be used* in blackening the circle to indicate responses on the answer sheet. In the following example, response "C" is so marked :  

(A)   (B)   ●   (D)
4. Do the encoding carefully as given in the illustrations. While encoding your particulars or marking the answers on answer sheet, you should blacken the circle corresponding to the choice in full and no part of the circle should be left unfilled. You may clearly note that since the answer sheets are to be scored/evaluated on machine, any violation of the instructions may result in reduction of your marks for which you would yourself be responsible.
5. You have to mark all your responses **ONLY** on the ANSWER SHEET separately given. *Responses marked on the Test Booklet or in any paper other than the answer sheet shall not be examined.* Use ball point pen for marking responses.
6. All items carry equal marks. Attempt all items.
7. Before you proceed to mark responses in the Answer Sheet fill in the particulars in the front portion of the Answer Sheet as per the instructions.
8. After you have completed the test, hand over the OMR answer sheet to the Invigilator.

# COMPUTER SCIENCE AND APPLICATIONS

## Paper III

Time Allowed : 2½ Hours]

[Maximum Marks : 150

*Note* :— This paper contains *Seventy five (75)* multiple choice questions, each question carries *two (2)* marks. Attempt *All* questions.

1. The stack in an 8085 microcomputer system can be described as a set of memory locations in the :  
(A) Read only memory                      (B) Secondary memory  
(C) R/W Memory                              (D) None of these
2. The inconsistency between the two copies (one copy in RAM and another copy in cache) is called :  
(A) Cache mapping problem              (B) RAM mapping problem  
(C) Cache coherence problem            (D) RAM coherence problem
3. In some CPUs, the most significant byte is stored in the numerically lowest memory address. This representation is called .....  
(A) little-endian                              (B) big-endian  
(C) small-endian                              (D) large-endian
4. The instruction INXB (8085 microprocessor) is a ..... byte instruction.  
(A) 0    (B) 1  
(C) 2    (D) 3

5. Typically ..... is used for synchronous transmission.
- (A) Single parity (B) RNR  
(C) Even parity (D) Cyclic parity
6. A recursive relationship between an entity and .....
- (A) itself (B) a subtype entity  
(C) an instance entity (D) an archetype entity
7. Which of the following is the first step in database development ?
- (A) Logical database design  
(B) Physical database design and definition  
(C) Enterprise data modeling  
(D) Database implementation

8. Given the following two languages :

$$L_1 = \{0^n 1^n 2^n \mid n \geq 1\}$$

$$L_2 = \{a^{n!} \mid n \geq 0\}$$

Which one of the following is *correct* ?

- (A) Only  $L_1$  is accepted by some linear bounded automaton  
(B) Only  $L_2$  is accepted by some linear bounded automaton  
(C) Both  $L_1$  and  $L_2$  are accepted by some linear bounded automaton  
(D) Both  $L_1$  and  $L_2$  are not accepted by linear bounded automaton

9. Given the following two languages :

$$L_1 = \{a^n b^n c^n \mid n \geq 0\}$$

$$L_2 = \{a^n b^j \mid n = j^2\}$$

Which of the following is *correct* ?

- (A) Only  $L_1$  is context free language
- (B) Only  $L_2$  is context free language
- (C) Both  $L_1$  and  $L_2$  are not context free language
- (D) Both  $L_1$  and  $L_2$  are context free language

10. Given the following two languages :

$$L_1 = \{(ab)^n a^k \mid n > k, k \geq 0\}$$

$$L_2 = \{1^n \mid n \text{ is a perfect square}\}$$

Which one of the following is *correct* ?

- (A)  $L_1$  is regular language and  $L_2$  is not regular language
- (B)  $L_1$  is not regular language and  $L_2$  is regular language
- (C) Both  $L_1$  and  $L_2$  are regular
- (D) Both  $L_1$  and  $L_2$  are not regular

11. The extension 'wav' is for :

(A) image

(B) video

(C) text

(D) audio

12. The shearing operation along X-axis takes the point (3, 4) to ....., given that shearing coefficient about X-axis is  $1/2$ .

(A) (4, 3)

(B) (5, 4)

(C) (4, 5)

(D) (4, 4)

13. LCD display devices :

(A) have poor viewing angle

(B) have electromagnetic emission

(C) have high luminance

(D) have high contract

14. In ..... projectors are *not* parallel to each other.

(A) Perspective projection

(B) Axonometric projection

(C) Cavalier projection

(D) Cabinet projection

15. .... is the process of issuing, testing and revising instructions for presenting materials on a computer system.
- (A) Animation (B) Authoring  
(C) Trimming (D) Vectorization
16. Given the following two statements :
- $S_1$  : Every context sensitive language is recursive.  
 $S_2$  : There is a recursive language that is not context sensitive.
- Which of the following is *correct* ?
- (A)  $S_1$  is correct and  $S_2$  is not correct  
(B)  $S_1$  is not correct and  $S_2$  is correct  
(C) Both  $S_1$  and  $S_2$  are correct  
(D) Both  $S_1$  and  $S_2$  are not correct
17. You are given an OR problem and a XOR problem to solve. Then, which one of the following statements is *correct* ?
- (A) OR problem can be solved using radial basis function and XOR problem can be solved using single layer perceptron  
(B) OR problem can be solved using single layer perceptron and XOR problem can be solved using multilayer perceptron  
(C) both OR problem and XOR problem can be solved using single layer perceptron  
(D) both OR problem and XOR problem can be solved only using multilayer perceptron

18. A regular language is a :
- (A) string
  - (B) deterministic finite automaton
  - (C) language accepted by a deterministic finite automaton
  - (D) set of outputs
19. The pumping lemma is used to show that a certain language is :
- (A) regular
  - (B) not regular
  - (C) finite language
  - (D) infinite language
20. The set of all nested sequences of balanced parentheses is a :
- (A) string
  - (B) regular expression
  - (C) regular language
  - (D) context free language
21. If  $\Sigma$  is an alphabet and  $S$  is a start symbol, then  $\left\{ W \in \Sigma^* \mid S \xRightarrow{*}_G W \right\}$  is :
- (A) a derivation
  - (B) the language generated by a grammar
  - (C) the language generated by a regular expression
  - (D) a pushdown automaton

22. If  $G$  has no negative cycles, then there is shortest path from  $s$  to  $t$  that is simple and hence has :

- (A) at least  $n - 1$  edges                      (B) at most  $n - 1$  edges  
(C) at most  $n$  edges                              (D) at least  $n$  edges

23. The stack and string are examples of :

- (A) abstract data types                              (B) overloaded operator functions  
(C) struct objects                                      (D) lipton information

24. If  $G$  has a topological ordering, then  $G$  is a :

- (A) Directed cyclic graph  
(B) Directed acyclic graph  
(C) Undirected cyclic graph  
(D) Undirected acyclic graph



25. First-order predicate calculus allows quantified variables to refer to :
- (A) predicates
  - (B) functions
  - (C) objects in the domain of discourse
  - (D) objects not in the domain of discourse
26. Assume that all edge costs are distinct. Let  $S$  be any subset of nodes that is either empty nor equal to all of  $V$ , and let edge  $e = (V, W)$  be the minimum cost edge with one end in  $S$  and the other in  $V-S$ . Then every minimum spanning tree :
- (A) will be empty
  - (B) does not contain the edge  $e$
  - (C) contains the edge  $e$
  - (D) none of these
27. Asynchronous Transfer Mode (ATM) is also referred to as .....
- (A) Cell relay
  - (B) Broad band
  - (C) Smart switching
  - (D) Grace routing

28. Suppose we have a class template called `stack` and we wish to make a class from the class template for a stack of strings. We also wish to declare a stack object called `stk` using this stack class. To do this, in the main program we would type the line of code :

(A) `stack stk <string>;`

(B) `stack string <stk>;`

(C) `stack <stk> string;`

(D) `stack <string> stk;`

29. Which of the following is a widely accepted technique that was chosen by ISO ?

(A) Tunnelling

(B) Tiering

(C) Obliquing

(D) Layering

30. A(n) ..... is a heap in which the value of each node is greater than or equal to the values of its children (if it has any children).

(A) binary heap

(B) max heap

(C) ordered heap

(D) complete heap

31. The IPV6 header has a fixed length of :
- (A) 16 octets (B) 24 octets  
(C) 32 octets (D) 40 octets
32. Which of the following is declaration for default constructor ?
- (A) `classname :: classname( );`  
(B) `classname :: classname(parameter list);`  
(C) `classname( );`  
(D) `classname( ) (parameter list);`
33. .... gives the method to invoke at run time.
- (A) Loading (B) Hiding  
(C) Typing (D) Dynamic binding
34. Which of the following is *true* in C++ ?
- (A) Pointer can never be null  
(B) Reference can never be null  
(C) Pointer cannot be changed  
(D) Reference can be changed

35. .... is an abstract data type.
- (A) int (B) double
- (C) string (D) class
36. When we use property and behaviour of a data without modifying it inside the class, which one of the following is better ?
- (A) aggregation
- (B) inheritance
- (C) extension
- (D) restriction
37. The windows NT/2000/XP supervisor does *not* include .....
- (A) NT executive (B) Hardware abstraction layer
- (C) Win 32 API (D) NT Kernel

38. Process managers provide the following abstract machine functions *except* :
- (A) Process creation and termination
  - (B) Process/thread synchronization
  - (C) Implementation of the address space
  - (D) Process memory leak error detection
39. Which of the following statements is *true* ?
- (A) Detection/recovery ignores distinction between safe and unsafe states
  - (B) Avoidance algorithms avoid only unrecoverable states
  - (C) Detection/recovery strategies are more conservative than avoidance strategies
  - (D) Detection/recovery determine if any sequence of transitions would result in all processes becoming unblocked
40. An example of an email user agent program is which of the following ?
- (A) UNIX pine
  - (B) UNIX cron
  - (C) UNIX EXIM
  - (D) UNIX sendmail

41. Which statement about the network layer is *incorrect* ?
- (A) Network layer defines its packet format to be identical to the data link layer frame format
  - (B) Host machines are identified on the internet using a network and host address
  - (C) In an internet, "nodes" are complete networks
  - (D) A specific network layer transmission may consist of several hops across individual networks
42. Which of the following is one of the two major types of decision support systems ?
- (A) Text oriented
  - (B) Number oriented
  - (C) Model oriented
  - (D) Application oriented
43. The de facto DSS hardware standard is a(n) ..... through which the DBMS provides data.
- (A) Web server
  - (B) Data center
  - (C) Mainframe
  - (D) Local area network

44. .... are essentially hierarchy of if then statements. They are most appropriate for categorical and interval data.

(A) Neural nets

(B) Time series

(C) Decision trees

(D) Time trees

45. In AI, a representation of ..... is a combination of data structures and interpretive procedures that is used in the right way in a program.

(A) Information

(B) Knowledge

(C) Intelligence

(D) Problem

46. Planning and constraint satisfaction are alike in that they both :

(A) are more efficient than  $A^K$  search

(B) allow for the use of domain independent heuristics that exploit structure

(C) can be used for game playing as well as problem solving

(D) are a good algorithmic fit for solving crossword puzzles

47. Which of the following problems is known to have a polynomial time solution ?

(A) Longest simple path problem for a given graph

(B) The 3-colorability problem in graphs

(C) The Eulerian cycle in a graph

(D) The Hamiltonian cycle in a graph

48. Which of the following algorithmic techniques is used to solve the 0 – 1 knapsack problem ?

(A) divide and conquer

(B) greedy

(C) dynamic programming

(D) branch and bound

49. Characters that occur more frequently have ..... Huffman codes.

(A) Longer

(B) Average

(C) Shorter

(D) Shorter or longer



50. The problem of sorting by comparisons is :
- (A)  $O(n)$  (B)  $O(n \lg n)$   
(C)  $\Omega(n \lg n)$  (D)  $\Omega(n^2)$
51. Which of the following algorithms can be used to most efficiently determine the presence of a cycle in a given graph ?
- (A) Kruskal's algorithm  
(B) Dijkstra's algorithm  
(C) Bellman-Ford algorithm  
(D) All-pairs shortest path algorithm
52. When a bit is sent over a binary symmetric channel the probability that it is received incorrectly is .02. The probability that 0000 is received as 1001 is  $(.0196)^k$  where  $k$  is :
- (A) 1 (B) 2  
(C) 3 (D) 4

53. Given the frequencies of the letters in a text is given below :

A            4

B            2

E            4

I            2

L            2

R            1

The Huffman code of A is :

(A) 00

(B) 01

(C) 10

(D) 11

54. The minimum distance of a linear code with parity check matrix H is equal to ..... number of linearly ..... columns of H.

(A) smallest positive, independent

(B) smallest positive, dependent

(C) largest positive, independent

(D) largest positive, dependent

55. In a Binary Hamming code the number of check digits is  $r > 0$  then the length of code word is :

(A)  $2^r + 1$

(B)  $2^r$

(C)  $2^r - 1$

(D)  $2^r - r - 1$

56. LZ compression methods are ..... for storage (Give appropriate answer).

(A) lossy

(B) lossless

(C) good

(D) skewed

57. The solution of LPP

$$\text{Max. } Z = 2x_1 + 2x_2$$

$$\text{s.t. } 3x_1 + 4x_2 \leq 18$$

$$6x_1 + x_2 \leq 12$$

$$x_1 \geq 0, x_2 \geq 0$$

is :

(A)  $x_1 = \frac{24}{7}$     $x_2 = \frac{10}{7}$

(B)  $x_1 = \frac{10}{7}$     $x_2 = \frac{24}{7}$

(C)  $x_1 = 0$     $x_2 = \frac{9}{2}$

(D)  $x_1 = 2$     $x_2 = 0$

58. The initial BFS of the following transportation problem using VAM :

	D	E	F	G	Availability
A	21	23	27	24	350
B	26	28	24	20	400
C	31	34	23	20	500
	300	325	375	250	Demand

is :

A		B		
21		23		27
				24
		C		D
26		28		24
				20
			E	F
31		34	23	20

The values of A, B, C, D, E, F are :

- (A) 300, 50, 275, 125, 375, 125
- (B) 50, 300, 125, 275, 125, 375
- (C) 250, 100, 275, 125, 375, 125
- (D) 300, 50, 250, 175, 375, 125

59. A company has five employees doing five jobs. The time in Hrs. each worker need to complete the job is shown below. Find the assignment so that total time is minimized :

		Time of Job				
		1	2	3	4	5
Worker	1	4	5	8	7	8
	2	2	6	3	2	6
	3	7	9	2	8	4
	4	5	3	4	6	7
	5	8	9	7	5	8

- (A)  $1 \rightarrow 2, 2 \rightarrow 3, 3 \rightarrow 5, 4 \rightarrow 1, 5 \rightarrow 4$
- (B)  $1 \rightarrow 1, 2 \rightarrow 3, 3 \rightarrow 5, 4 \rightarrow 2, 5 \rightarrow 4$
- (C)  $1 \rightarrow 3, 2 \rightarrow 1, 3 \rightarrow 5, 4 \rightarrow 2, 5 \rightarrow 4$
- (D)  $1 \rightarrow 2, 2 \rightarrow 3, 3 \rightarrow 4, 4 \rightarrow 5, 5 \rightarrow 1$
60. Ellipsoid method for solving LPP has ..... time worst case complexity.
- (A) polynomial
- (B) Non-polynomial
- (C) constant
- (D) none of these

61. In a Matroid  $M$  on set  $E$  :

(A) A set  $C \subseteq E$  is circuit  $\Leftrightarrow$  it is maximal dependent set

(B) A set  $C \subseteq E$  is basis  $\Leftrightarrow$  it is minimal dependent set

(C) A set  $C \subseteq E$  is circuit  $\Leftrightarrow$  it is minimal dependent set

(D) A set  $C \subseteq E$  is circuit  $\Leftrightarrow$  it is maximal independent set

62. The perceptron learning rule is an algorithm for adjusting the network weights

$W$  to :

(A) minimize the difference between input and outputs

(B) maximize the difference between input and outputs

(C) minimize the difference between the actual and desired outputs

(D) maximize the difference between the actual and desired outputs

63. If two fuzzy sets X and Y are given with membership functions :

$$\mu_X(x) = \{0.3, 0.1, 0.6, 0.2, 0.4\}$$

$$\mu_Y(x) = \{0.2, 0.4, 0.8, 0.5, 0.3\}$$

The value of  $\mu_{\overline{X \cup Y}}$  will be :

(A)  $\{0.3, 0.4, 0.8, 0.5, 0.4\}$

(B)  $\{0.2, 0.1, 0.6, 0.2, 0.3\}$

(C)  $\{0.7, 0.6, 0.2, 0.5, 0.6\}$

(D)  $\{0.8, 0.9, 0.4, 0.8, 0.7\}$

64. An artificial neuron received  $d$  inputs  $x_1, x_2, \dots, x_d$  with weights  $w_1, w_2, \dots, w_d$  attached to the input links. The net input passed to the neuron is given by :

(A)  $\sum x_i$

(B)  $\sum w_i$

(C)  $\sum w_i x_i$

(D)  $\sum w_i + \sum x_i$

65. Consider a fuzzy set Young as defined below :

$$\text{Young} = \{(20, 1), (30, .8), (40, .6), (50, .4), (60, .2), (70, 0)\}$$

Then the alpha-cut for  $\alpha = 0.4$  for the set Young will be :

(A)  $\{(20, 0), (30, 0), (40, 0), (50, 1), (60, 1), (70, 1)\}$

(B)  $\{(20, 1), (30, 1), (40, 1), (50, 0), (60, 0), (70, 0)\}$

(C)  $\{(20, 0), (30, 0), (40, 0), (50, 0), (60, 1), (70, 1)\}$

(D)  $\{(20, 1), (30, 1), (40, 1), (50, 1), (60, 0), (70, 0)\}$

66. A peer-peer (or peer-to-peer) network is called a ..... in Windows terminology.
- (A) domain (B) LAN  
(C) Workgroup (D) Container
67. Under UNIX, the death of a process generates a(n) ..... that produces a(n) .....
- (A) event/signal (B) signal/event  
(C) interrupt/signal (D) signal/interrupt
68. The UNIX CPU scheduling algorithm favours :
- (A) CPU bound processes (B) I/O bound processes  
(C) Real time processes (D) Virtual processes
69. You can remove the Bourne shell variable, called boxers, from the environment by executing the following command :
- (A) set-r boxers (B) del boxers  
(C) unset boxers (D) set boxers



70. Thrashing is a :

- (A) high paging activity
- (B) high executing activity
- (C) extremely long process
- (D) extremely long virtual memory

71. .... is most important phase of SLDC.

- (A) Design
- (B) Requirement analysis
- (C) Testing
- (D) Coding

72. In ..... each module is tested in an attempt to discover any errors in the code.

- (A) Integration testing
- (B) Mutation
- (C) Unit testing
- (D) Programming

73. Testing the software with actual data in actual environment is .....
- (A) Alpha testing (B) Beta testing
- (C) Unit testing (D) Integration testing
74. Running a system under live environment using live data is ..... testing.
- (A) Alpha (B) Beta
- (C) Acceptance (D) Software
75. Which of the following does *not* require any knowledge of the inner working of particular software component ?
- (A) Architectural design metric (B) Prototyping
- (C) Component metric (D) Complexity metric