1107

T.B.C. : 22/14/ET

Booklet Sr. No. ....

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.

P.T.O.

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. In 8085 microprocessor, STAX B is a .... byte instruction :

    (A) zero   (B) one

    (C) two   (D) three

2. Assume that a command is received to write a word in the memory. If that word in the cache, both the cache contents and the memory contents have to be changed. If both are updated simultaneously, it is known as .... method.

    (A) Full through   (B) Altered bit

    (C) Write through   (D) Copy back

3. IEEE double precision representation for floating point numbers uses ....

    (A) 16 bits   (B) 32 bits

    (C) 64 bits   (D) 72 bits

4. The effective address in the case of index addressing mode is :

    (A) Content of accumulator + The value in the displacement field

    (B) Content of index register + Content of accumulator

    (C) Content of index register + Displacement value contained in the address field of the instruction

    (D) Content of index register + Content of program counter

5. An iterative DFS traversal algorithm uses a(n) ....

   (A) Queue   (B) Stack

   (C) Array   (D) List

6. Which of the following two files are used operation of the DBMS ?

   (A) DML and query languages

   (B) Data dictionary and transaction log

   (C) Query language and utilities

   (D) None of the above

7. .... is a preferred method for enforcing data integrity.

   (A) Constraints   (B) Cursors

   (C) Stored procedure   (D) Triggers

8. Given the following two languages :

   $$L_1 = \{0^n 1^n \mid n \geq 0, n \neq 100\}$$

   $$L_2 = \{w \in \{a, b, c\}^* \mid n_a(w) = n_b(w) = n_c(w)\}$$

   Which one of the following is *correct* ?

   (A) Only L_1 is context free

   (B) Only L_2 is context free

   (C) Both L_1 and L_2 are context free

   (D) Both L_1 and L_2 are not context free

9. Given the following context-free grammar with production rules :

$S \rightarrow aS|A|C$

$A \rightarrow a$

$B \rightarrow aa$

$C \rightarrow aCb$

After eliminating useless symbols and productions, the equivalent context free grammar is given by :

(A) $S \rightarrow aS|A$

$A \rightarrow a$

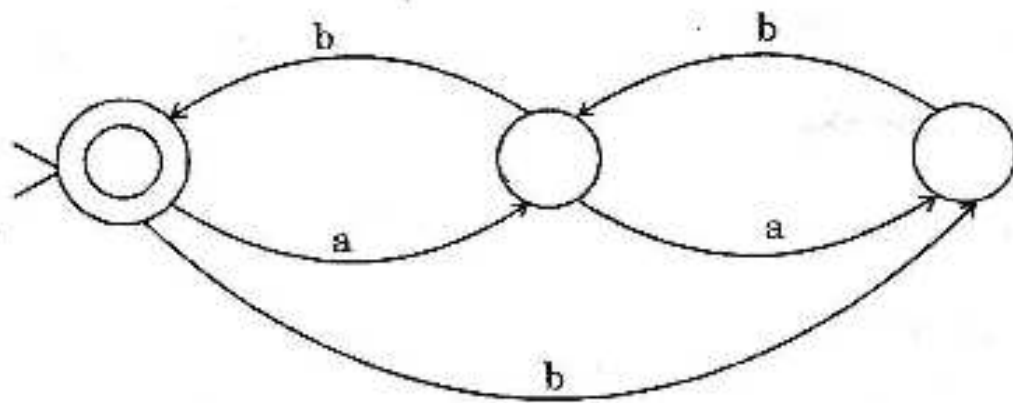$B \rightarrow aa$

(B) $S \rightarrow aS|aA$

$A \rightarrow a$

$B \rightarrow aa$

(C) $S \rightarrow aS|A$

$A \rightarrow a$

(D) None of the above

10. The regular expression for the language accepted by the automata given below is :

(A) $((aa + b) (bb^*) bb^*)^*$

(B) $(ab + (aa + b) ba^*)^*$

(C) $(ab + (aa + b) (ba)^* bb^*)^*$

(D) $(ab + (aa + b) (ab)^* bb^*)^*$

11. Given the following languages :

$$L_1 = \{a^n b^m \mid n \leq m\}$$

$$L_2 = \{w \mid n_a(w) \neq n_b(w)\}$$

Which of the following is *correct* ?

(A) L_1 is regular and L_2 is not regular language

(B) L_1 is not regular 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

12. If the parse tree of a word W generated by a Chomsky normal form grammar has no path of length greater than j, then the word W is of length :

(A) no greater than j

(B) no greater than 2^{j-1}

(C) no greater than 2^{j+1}

(D) no greater than 2^j

13. Match the following List I with List II and select the *correct* answer by using the codes given below the lists :

List I

(a) Pushdown automaton

(b) Turing machine

(c) Linear bounded automaton

(d) Deterministic finite automaton

List II

(i) Regular grammar

(ii) Unrestricted grammar

(iii) Context free grammar

(iv) Context sensitive grammar

Codes :

	(a)	(b)	(c)	(d)
(A)	(iv)	(ii)	(iii)	(i)
(B)	(ii)	(iv)	(iii)	(i)
(C)	(iii)	(ii)	(iv)	(i)
(D)	(iii)	(iv)	(ii)	(i)

14. Given the following two statements :

S_1 : Recursive enumerable sets are closed under complementation

S_2 : Recursive sets are closed under complementation

Which of the following is *correct* ?

(A) Only S_1 is correct

(B) Only S_2 is correct

(C) Both S_1 and S_2 are correct

(D) Neither S_1 nor S_2 is correct

15. A proof that a language is *not* context free is often done by :

(A) induction

(B) construction

(C) diagonalization

(D) the pumping lemma for context free language

16. Which of the following is a basic file transfer protocol that supports the transfer of files among systems with different characteristics ?

(A) Telnet

(B) UDP

(C) FTP

(D) SMTP

17. A(n) .... occurs when any two elements are out of order.

(A) Pivot

(B) Swap

(C) Partition

(D) Inversion

18. What type of name space does DNS use ?

(A) Root design structured

(B) Tree structured

(C) Pyramid structured

(D) 32 bit structured

19. The sorting algorithm where the time complexity depends on both the range

and the number of elements is :

(A) Quick sort

(B) Heap sort

(C) Insertion sort

(D) Counting sort

20. A procedure referred to as a two-way handshake is a :

(A) SYN exchange

(B) ACK exchange

(C) LISTEN exchange

(D) FIN exchange

21. The hashing of an index file is an appropriate implementation for which of the following operations on an external table ?

   (A) sorted traversal

   (B) retrieval of the smallest or the largest item

   (C) insertion of an item

   (D) range queries that require ordered data

22. The .... provides support for data integrity and authentication of IP packets. The data integrity feature ensures that undetected modification to a packet's content in transit is not possible. It also prevents address spoofing attacks.

   (A) authentication data   (B) authentication header

   (C) padding   (D) security parameters index

23. Which of the following is *not* true about a red-black tree ?

   (A) It requires more storage than a 2-3-4 tree

   (B) It is balanced

   (C) Its insertion operation requires one pass from root to leaf

   (D) Its deletion operation requires one pass from root to leaf

24. The layer 2 switch that accepts a frame on an input line, buffers it briefly, and then routes it to the appropriate output line is the ....

(A) store-and-forward switch

(B) layer 3 switch

(C) cut-through switch

(D) sub-network

25. A .... of height h is full down to level $h-1$, with level h filled in from left to right.

(A) full binary tree

(B) complete binary tree

(C) general tree

(D) balanced binary tree

26. A process of extraction of shared characteristics from two or more classes and combing them into a superclass is called :

(A) Inheritance

(B) Generalization

(C) Specialization

(D) Extension

27. When we use and modify the property and behaviour of a class, which one of the following is better ?

(A) Inheritance

(B) Aggregation

(C) Extension

(D) Polymorphism

28. Which of the following is *not* a manager function in C++ (f is a class) ?

(A) constructor f( )

(B) copy constructor f(intx, inty)

(C) destructor ~ f( );

(D) cout<<x;

29. .... is *not* type of constructor.

(A) Default constructor

(B) Parameterized constructor ·

(C) Friend

(D) None of these

30. The number of instances of an abstract class that can be created is :

(A) 0

(B) 1

(C) 2

(D) 3

31. A problem is said to be NP-complete :

(A) If it is as 'hard' as any problem in NP

(B) A non-polynomial time algorithm has been discovered

(C) A polynomial time algorithm can exist but needs a parallel compute

(D) There is greedy solution to the problem

32. The Kruskal, Prim and Dijkstra algorithms are examples of :

(A) divide and conquer

(B) greedy

(C) dynamic programming

(D) probabilistic

33. Strassen's algorithm is able to perform matrix multiplication in time ....

(A) $O(n^{2.61})$ (B) $O(n^{2.71})$

(C) $O(n^{2.81})$ (D) $O(n^3)$

34. Which of the following is used to design a solution to the fractional knapsack

problem ?

(A) Divide and conquer

(B) Dynamic programming

(C) Greedy

(D) Exhaustive search

35. Huffman's algorithm is an example of :

    (A) divide and conquer   (B) dynamic programming

    (C) greedy   (D) probabilistic

36. .... is used to reduce the number of tree branches and the number of static evaluation applied in the case of game tree.

    (A) Minmax algorithm

    (B) Constraint satisfaction algorithm

    (C) Alpha beta purning

    (D) Backtracking

37. A(n) .... is a rule based system that provides a solution, usually in one functional area such as finance or manufacturing, to a specific repetitive managerial problem.

    (A) Transaction Processing System (TPS)

    (B) Decision Support System (DSS)

    (C) Online Analytical Processing (OLAP) System

    (D) Automated Decision System (ADS)

38. Which of the following is the informal, judgemental knowledge of an application area that constitutes the "rules of good judgement" in the field ?

(A) Binary Search

(B) Algorithm

(C) Heuristic

(D) Rule of thumb

39. Which of the following is *not* a component of a production system ?

(A) Database

(B) Control system

(C) Production rules

(D) Associative memory

40. Given an undirected graph G(V, E) a subset $M \subseteq E$ is a .... if each node appears in at most one edge in M.
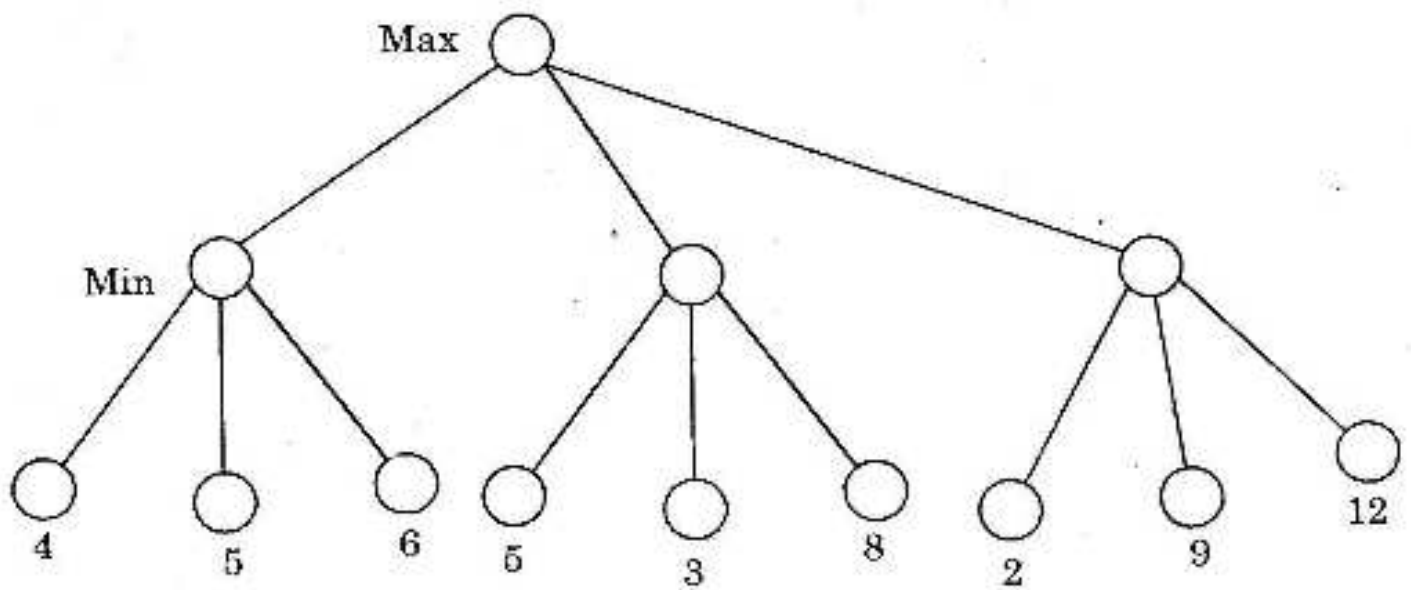
(A) Matching

(B) Perfect matching

(C) Basis

(D) Circuit

41. Consider the following part of two player game tree :

What will be the value of the top Max node ?

(A) 4

(B) 5

(C) 6

(D) 7

42. A linear code is k-error correcting $\Leftrightarrow$ if its minimum distance is at least ....

(A) $k + 1$

(B) $2k - 1$

(C) $2k$

(D) $2k + 1$

43. A code over GF(q) has M code words each of length n and minimum distance d and $d \geq 2\,k + 1$, then $M\sum_{r=0}^{k} \binom{n}{r}(q-1)^r$ is :

(A) $\leq q^{n-1}$

(B) $\leq q^k$

(C) $\leq q^n$

(D) $\geq q^n$

44. Let X be a discrete random variable with possible values $(x_1, x_2, \ldots, x_n)$ and probability mass function P(X), the entropy is defined as :

$$H(X) = \Sigma P(x_i) \log_b P(x_i)$$

where b is equal to :

(A) 5

(B) 4

(C) 3

(D) 2

45. Let $f(m, n)$ and $g(m, n)$ be two matrices. The convolution of f and g $f(m, n)$ $\circledast$ $g(m, n)$ = DFT $f(m, n)$ $\boxtimes$ DFT $g(m, n)$, where $\boxtimes$ is .... operation

(A) Addition

(B) Subtraction

(C) Multiplication

(D) Division

46. When a bit is sent over a binary symmetric channel the probability that a bit is received correctly is 99. The probability that 1111 is received as 0110 is 99×10^k, where k is equal to

(A) 8

(B) −8

(C) −16

(D) −32

47. Consider two fuzzy subsets of the set X,

$$X = \{a, b, c, d, e\}$$

referred to as A and B are given by :

$$A = \{(a, 1), (b, 0.3), (c, 0.2), (d, 0.8), (e, 0)\}$$

$$B = \{(a, 0.6), (b, 0.9), (c, 0.1), (d, 0.3), (e, 0.2)\}$$

Then, the support of A and card of B are :

(A) $\{a, b, c, d, e\}$ and 2.1 respectively

(B) $\{a, b, c, d\}$ and 2.1 respectively

(C) 2.1 and $\{a, b, c, d, e\}$ respectively

(D) 2.1 and $\{a, b, c, d\}$ respectively

48. Identify the following activation function in artificial neural network :

$$\phi(V) = Z + \frac{1}{1 + e^{-(XV + Y)}}$$

where Z, X and Y are parameters.

(A) Step function

(B) Ramp function

(C) Sigmoid function

(D) Gaussian function

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

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

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

Then the value of $\mu_{\overline{X} \cap \overline{Y}}$ will be :

(A) {0.2, 0.1, 0.6, 0.2, 0.3}

(B) {0.3, 0.4, 0.8, 0.5, 0.4}

(C) {0.8, 0.9, 0.4, 0.8, 0.7}

(D) {0.7, 0.6, 0.2, 0.5, 0.6}

50. Which of the following can be used for clustering of data ?

(A) Multilayer perceptron

(B) Single layer perceptron

(C) Radial basis function

(D) Self organizing map

51. Consider X = {1, 2, 3, 4, 5} and the fuzzy set A defined as :

A = {(1, .1), (2, .2), (3, .5), (4, .7) (5, 1)}

Then the alpha cut for alpha = 0.5 for the set A will be :

(A) {(1, 0), (2, 0), (3, 0), (4, 1) (5, 1)}

(B) {(1, 1), (2, 1), (3, 1), (4, 0) (5, 0)}

(C) {(1, 0), (2, 0), (3, 1), (4, 1) (5, 1)}

(D) {(1, 1), (2, 1), (3, 0), (4, 0) (5, 0)}

52. There are five workers and five jobs the time in hours. Each worker needs to complete the job is given by the following matrix. Find the assignment so that the total time is minimized :

$$
\begin{array}{c}
\text{Workers} \\
\end{array}
\begin{array}{c}
\quad\quad\quad \text{Jobs} \\
\begin{array}{cccccc}
 & 1 & 2 & 3 & 4 & 5 \\
1 & 9 & 8 & 7 & 6 & 5 \\
2 & 5 & 6 & 7 & 8 & 9 \\
3 & 1 & 2 & 3 & 4 & 5 \\
4 & 5 & 4 & 3 & 2 & 1 \\
5 & 4 & 4 & 4 & 4 & 4 \\
\end{array}
\end{array}
$$

(A) $1 \to 5,\ 2 \to 2,\ 3 \to 4,\ 4 \to 1,\ 5 \to 3$

(B) $1 \to 4,\ 2 \to 1,\ 3 \to 2,\ 4 \to 5,\ 5 \to 3$

(C) $1 \to 2,\ 2 \to 3,\ 3 \to 4,\ 4 \to 5,\ 5 \to 1$

(D) $1 \to 2,\ 2 \to 3,\ 3 \to 5,\ 4 \to 1,\ 5 \to 4$

53. The LPP :

Max. $Z = c_1 x_1 + c_2 x_2 + c_3 x_3$

S.T.

$ax_1 + bx_2 + cx_3 \geq d_1$

$ex_2 + fx_1 + gx_3 \geq d_2$

$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0$

has .... solution.

(A) Unbounded

(B) Bounded

(C) Alternate

(D) One

54. The initial BFS using VAM for the following transportation problem so as to maximize the total load carried by trucks from each base B_i to each target T_j :

	T₁	T₂	T₃	Capability
B_1	10	8	10	150
B_2	5	8	12	150
B_3	10	20	8	150
B_4	12	8	8	150
Requirement	200	200	200	

is given as :

	T₁	T₂	T₃
B_1		A	
B_2			B
B_3	C	D	E
B_4	F		

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

(A) 50, 50, 50, 150, 150, 50

(B) 50, 150, 50, 50, 150, 150

(C) 150, 50, 50, 50, 150, 150

(D) 150, 150, 50, 50, 50, 150

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55. Which one of the following is *correct* ?

(A) In any network, the value of max flow is not equal to capacity of min cut

(B) In any network, the value of max flow is equal to capacity of min cut

(C) In any network, the value of max flow is less than capacity of min cut

(D) In any network, the value of max flow is more than capacity of min cut

56. Ready, waiting and zombie are :

(A) States of the UNIX Kernel

(B) CPU states in the UNIX system

(C) Process states in the UNIX system

(D) System calls

57. In UNIX, the priority of a process is :

(A) Inversely proportional to the nice value of the process

(B) Inversely proportional to the recent CPU usage of the process

(C) Inversely proportional to the priority number of the process

(D) All of the above

58. A(n) .... is a network service that makes the directory available to users, administrators, and applications.

   (A) directory service

   (B) active directory

   (C) shared directory

   (D) shared folder

59. A set of networks interconnected by routers within a specific area using same routing protocol is called :

   (A) inter-domain router

   (B) intra-domain router

   (C) back-bone

   (D) domain

60. UNIX block I/O is ....

   (A) asynchronous

   (B) synchronous

   (C) spooled

   (D) none of these

61. Risk analysis of a project is done in :

   (A) System analysis   (B) Implementation phase

   (C) Feasibility study   (D) Coding

62. White-box testing can be started after :

   (A) design   (B) requirement analysis

   (C) installation   (D) programming

63. .... metrics measures the logical complexity of the source code.

   (A) Component   (B) Architecture

   (C) Complexity   (D) System

64. .... cost comprise all the costs to developer.

   (A) Internal   (B) Material and travel

   (C) Developing   (D) Inspection

65. Which one of the following is *incorrect* with respect to aim of Software Engineering for developing software ?

    (A) Fault free

    (B) Delivered on time

    (C) Does not satisfy user's need

    (D) Delivered within budget

66. Raster display devices :

    (A) do not allow solids to be displayed

    (B) whole screen is not continuously updated

    (C) occupy a large volume

    (D) do not require screen-sized memory array

67. Rotation of the point (−3, 4) about origin through an angle of 90° gives th point $k(−4, −3)$, where k is equal to :

    (A) 0   (B) 1

    (C) 2   (D) 3

68. The extension 'mov' is for :

(A) Audio

(B) Video

(C) Image

(D) Text

69. .... is the process of calculating the number of frames between keyframes and the path of action takes.

(A) Reversing

(B) Slicing

(C) Tweening

(D) Morphing

70. In .... projection, the projectors are perpendicular to projection plane.

(A) Cavalier

(B) Oblique

(C) Orthographic

(D) Cabinet

71. Which is *not* required for a thread to overlap its CPU and I/O operations ?

(A) The thread has other work to do, while waiting for the I/O to complete

(B) The I/O operation must be slow, relative to CPU speed

(C) The OS must provide tools to poll the device

(D) The programming language must provide support for overlap

72. Which is *not* a commonly recognized semantic for send/receive ?

    (A) Asynchronous receive( )   (B) Synchronous send( )

    (C) Blocking receive( )   (D) Non-blocking receive

73. A nanosecond is :

    (A) one hundredth of a second

    (B) one millionth of a second

    (C) one billionth of a second

    (D) none of the above

74. Major tasks in general distributed process management *do not* include :

    (A) IPC   (B) Scheduling

    (C) Synchronization   (D) Deadlock management

75. Which is *not* file system dependent ?

    (A) Byte stream (un)marshalling

    (B) Block management

    (C) System call interface

    (D) Manipulating external file descriptor