

TEST BOOKLET
COMPUTER SCIENCE AND APPLICATION
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 APPLICATION

Paper III

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

1. Which of the following statements is *false* (w.r. to windows) ?
 - (A) Every process has a process heap
 - (B) Every heap has a handle
 - (C) The programmer can not use the process heap or create new ones
 - (D) The handle for the process heap returns null on failure
2. Which of the following symbol table implementation is best suited if access time is to be minimum ?
 - (A) Binary search tree
 - (B) Linear list
 - (C) Self-organization list
 - (D) Hash table
3. In UNIX, the output of command `expr xyz = xyz` is :
 - (A) `xyz`
 - (B) `2xyz`
 - (C) `1`
 - (D) `2`
4. The output of the following program is :

```
for number in 10, 11, 5
do
    echo "$number\c"
done
```

 - (A) `"10 11 5 \C"`
 - (B) `number number number`
 - (C) `10115`
 - (D) `10 11 5`

5. The basic limitation of a finite state machine is that :

- (A) It sometimes fails to recognize grammars that are regular
- (B) It sometimes recognizes grammar that are not regular
- (C) It can't remember arbitrary large amount of information
- (D) All of the above

6. Let

$$L_1 = \{a^n b^n c^k \mid n, m, k = 1, 2, 3, \dots\}$$

$$L_2 = \{a^n b^m c^m \mid n, m, k = 1, 2, 3, \dots\}$$

$$L_3 = \{a^n b^n c^n \mid n = 1, 2, 3, \dots\}$$

Which of the following is *correct* ?

(A) $L_3 = \bar{L}_1 \cap \bar{L}_2$

(B) L_1 and L_2 are context free language (CFL) but L_3 is not a context free language

(C) L_1 and L_2 are not CFL but L_3 is a CFL

(D) L_1 is a subset of L_3

7. The command to turn on command line editing option is :
- (A) `set - 0 vi` (B) `EDITOR = /usr/bin/vi`
(C) `VISUAL = /usr/bin/vi` (D) all of the above
8. The command `ln xxx yyy`
- (A) Creates a new i-node number for yyy
(B) Creates a new i-node number for xxx
(C) Creates no new i-node number
(D) Assigns a new i-node number to both yyy and xxx
9. The set of regular languages over a given alphabet is *not* close under :
- (A) Intersection (B) Homomorphism
(C) Substitution (D) None of these
10. Any string of terminals that can be generated by the following context free grammar :

$$S \rightarrow XY$$

$$X \rightarrow 0X | 1X | 0$$

$$Y \rightarrow Y0 | Y1 | 0$$

- (A) has at least one '1'
(B) should end with '0'
(C) has no consecutive 0's or 1's
(D) has at least two 0's

11. Applets do not normally have constructors. The method performs the initialization of instance variables.

- (A) setJMenuBar() (B) init()
(C) paint() (D) close()

12. The special syntax for invoking a constructor of base class (in Java) is :

- (A) super() (B) base()
(C) parent() (D) child()

13. Which of the following statements is *not* correct ?

- (A) $L = \{a^n b^n a^n \mid n=1, 2, 3, \dots\}$ is recursively enumerable
(B) Recursive languages are closed under union
(C) Every recursively enumerable language is recursive language
(D) Recursive languages are closed under intersection

14. A deterministic machine can be used to multiply two given integers.

Which of the following is *correct* option for the above statement :

- (A) true (B) false
(C) may be true (D) none of these

15. The HTML tag used to insert a horizontal line on a page is :
- (A) `<hr>` (B) `<hl>`
(C) `<hreb>` (D) `
`
16. Which of the following is *not* a web compatible file type ?
- (A) .gif (B) .bmp
(C) .jpg (D) .png
17. The dot operator connects the following two entities (reading from left to right) :
- (A) A class object and a class
(B) A class member and a class object
(C) A class object and a member of that class
(D) A class and a member of that class
18. The first three members of an enum type are normally represented by the values :
- (A) 0, 1, 2 (B) 1, 2, 3
(C) -1, 0, 1 (D) none of these

19. Select the *false* statement regarding inheritance :

- (A) A derived class can contain more attributes and behaviours than its base class
- (B) Base classes are usually more specific than derived classes
- (C) A derived class can be the base class for other derived classes
- (D) Some derived classes can have multiple base classes

20. The difference between class and struct is that in a class the members are by default, while in a structure they are by default.

- (A) private, private
- (B) private, public
- (C) public, private
- (D) public, public

21. A class hierarchy :

- (A) shows the same relationship as an organization chart
- (B) describes "has a" relationship
- (C) describes "is a kind of" relationship
- (D) shows the same relationship as a family tree

22. The measures the ability of a computer to complete a single task.
- (A) clock speed (B) speed metric
(C) execute cycle (D) cycle time
23. A portion of main memory used as a buffer to hold data temporarily that is to be read out to disk is referred to as a
- (A) disk cache (B) latency
(C) virtual address (D) miss
24. A clique in an undirected graph $G = (V, E)$ is a subset $V' \subseteq V$ of vertices such that :
- (A) if $(u, v) \in E$ then $u \in V'$ or $v \in V'$ or both
(B) if $(u, v) \in E$ then $u \in V'$ and $v \in V'$
(C) each pair of which is connected by an edge in E
(D) each pair of which is not connected by an edge in E
25. For, the address field references a main memory and the referenced register contains a positive displacement from the address.
- (A) indexing
(B) base-register addressing
(C) relative addressing
(D) all of the above

26. A computer system has a cache with cache access time 8 ns, and physical memory access time 48 ns. If the hit ratio is 75%, what is the average memory access time :

(A) 10 ns

(B) 18 ns

(C) 30 ns

(D) 40 ns

27. An efficient algorithm to find the longest monotonically increasing subsequence of a sequence of n numbers is :

(A) $\lg n$

(B) n

(C) $n \lg n$

(D) n^2

28. Kruskal's algorithm is a :

(A) Divide-conquer and combine algorithm

(B) Dynamic programming

(C) Greedy algorithm

(D) Branch and bound algorithm

29. If a register contains 10001100, what would be content of register if you apply arithmetic shift right operation twice :
- (A) 00100011 (B) 01100011
(C) 11100011 (D) 10100011
30. There are 4 different algorithms A_1 , A_2 , A_3 and A_4 to solve a given problem with the order $\log(n)$, $\log(\log(n))$, $n \log(n)$ and $\frac{n}{\log(n)}$ respectively. Which is the best algorithm ?
- (A) A_1 (B) A_2
(C) A_3 (D) A_4
31. A text is made up of the characters a, b, c, d, e, and f each having frequency 45, 13, 12, 16, 9 and 5 (in thousands) respectively. The optimal coding can be encoded in :
- (A) 144,000 bits (B) 224,000 bits
(C) 286,000 bits (D) 300,000 bits
32. Which type operation has side effects ?
- (A) update (B) append
(C) query (D) scope

33. Which of the following model business rules ?

(A) database planning

(B) database analysis

(C) database design

(D) operations

34. What is the *correct* order for solving a problem using genetic algorithm ?

(i) Choose the best individuals from the population for crossover

(ii) Choose initial population

(iii) Evaluate the fitness of each individual

(A) (i), (ii) and (iii)

(B) (i), (iii) and (ii)

(C) (ii), (i) and (iii)

(D) (ii), (iii) and (i)

35. An artificial intelligence system must form a meaningful and usefulof the internal information.

(A) Representation

(B) Execution

(C) Learning

(D) Planning

38. Breadth-first search is a good idea when you are confident that the branching factor is :

- (A) Small (B) Medium
(C) Large (D) Very large

39. Assume the following tables, describing employees and the departments in which they work :

Emp(eid : integer, ename : string, salary : real)

Works(eid : integer, did : integer)

Dept(did : integer, dname : string)

Which of the following outputs the names (ename) and salaries (salary) of all employees that work in the department name(dname) "accounts"

- (A) SELECT E.ename E.salary
From Emp A, works W, dept D
Where E.eid = W.eid AND W.did = D.did AND
D.dname = "accounts"
- (B) SELECT E.name E.salary
Where E.eid = W.eid AND W.did = D.did AND
D.dname = "accounts"
- (C) SELECT E.ename, E.salary
FROM EMP E, WORKS W, DEPT D
Where E.eid = W.eid AND W.did = D.did AND
D.dname = "accounts"
- (D) None of the above

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

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

$$\mu_Y(Y) = \{0.4, 0.7, 0.3, 0.7, 0.4\}$$

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

(A) $\{0.6, 0.3, 0.4, 0.3, 0.4\}$

(B) $\{0.4, 0.7, 0.6, 0.7, 0.6\}$

(C) $\{0.9, 0.6, 0.7, 0.7, 0.6\}$

(D) $\{0.1, 0.4, 0.3, 0.3, 0.4\}$

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

(A) Decision tree

(B) Single layer perceptron

(C) Multilayer perceptron

(D) None of these

42. Consider a relation having attributes ABCDE in which the only non-trivial

FDs are $D \rightarrow C$ and $AB \rightarrow CDE$. What is the key of the relation ?

(A) D

(B) C

(C) AB

(D) None of these

43. With all of the actions of a transaction are either committed or not committed.
- (A) Location transparency
 - (B) Replication transparency
 - (C) Commit transparency
 - (D) Failure transparency
44. In all calculations involving entropy we define to be
- (A) $0 \log 10, 1$
 - (B) $0 \log 0, 1$
 - (C) $0 \log 0, 0$
 - (D) $1 \log 1, 1$
45. If there are multiple parts to the antecedent, apply fuzzy logic and resolve the antecedent to a single number between 0 and 1.
- (A) Rules
 - (B) Condition
 - (C) Operator
 - (D) None of these
46. A(an) is a software that runs in support of another program.
- (A) Service
 - (B) Operating system
 - (C) Interface
 - (D) Application program

47. Common directory administration commands do not include :

(A) Sort

(B) Traverse

(C) Rename

(D) Delete

48. is the process by which the fuzzy sets that represents the outputs of each rule are combined into a single fuzzy set.

(A) Aggregation

(B) Fuzzification

(C) Implication

(D) None of these

49. Which statement about segmentation is *false* ?

(A) Segmentation provides explicit program control over the units of transfer in the memory system

(B) Segments can be more efficient than paging

(C) Segmentation (Vs. paging) is rarely better suited to the behaviour of processes

(D) The virtual memory system has more difficulty placing segments, rather than pages in memory

50. How many context switches occur whenever application processes are multiplexed ?
- (A) 1 (B) 2
(C) 4 (D) 8
51. Which software is used for summarizing statistical, mathematical and economic data ?
- (A) SPSS (B) GUI
(C) CAD (D) None of these
52. A major component of a GUI is :
- (A) Object oriented language (B) Window Manager
(C) Visual language (D) None of these
53. It is a pointing device which has a photocell mounted at its tip :
- (A) Joystick (B) Mouse
(C) Photoelectric pen (D) Light pen

54. A software that enables one to write multimedia applications is called :
- (A) Authoring tool (B) Web authoring
(C) Rendering tool (D) Image processing tool
55. creates an environment that surrounds the user so that they become part of experience.
- (A) Keyframe (B) Virtual reality
(C) Tweening (D) None of these
56. In transfer the sender and receiver are *not* in step.
- (A) Synchronous
(B) Asynchronous
(C) Both (A) and (B)
(D) None of the above
57. Find the odd man out :
- (A) Twisted pair (B) Coaxial pair
(C) Optical fiber (D) Infrared

58. Which layer(s) of OSI reference model is (are) *not* present in TCP/IP ?
- (A) Presentation layer (B) Session layer
(C) Both (A) and (B) (D) None of these
59. Which of the following is *not* symmetric cipher ?
- (A) DES (B) AES
(C) IDEA (D) RSA
60. Which of the following monitors the response time of multiple devices and generates an e-mail alert ?
- (A) System details update (B) Network monitor
(C) Bandwidth monitor (D) None of these
61. In DFD the symbol is used for :
- (A) Process (B) Source or sink
(C) Data store (D) Data flow

62. The evolutionary prototyping is :
- (A) Quick (B) Dirty
(C) Rigorous (D) Build on difficult parts
63. In which approach of programming each module is used at most once by its parent :
- (A) Top-down approach (B) Bottom-up approach
(C) Both (A) and (B) (D) None of these
64. What is recommended practice for software design description ?
- (A) IEEE 830-1993 (B) IEEE STD 1016-1998
(C) IEEE STD 610.12-1990 (D) None of these
65. "Confirming that the output from a development phase meets the input requirements for that phase" means :
- (A) Verification (B) Validation
(C) Reverse engineering (D) None of these

66. Fourier transform of a Gaussian function with S.D. = 1 is another Gaussian function with S.D.

(A) π

(B) 2π

(C) $\frac{1}{2}\pi$

(D) $\frac{1}{\pi}$

67. Let A and B be two alphabets. The joint entropy $H(A, B)$ is :

(A) $H(A, B) = H(A) + H(B) - I(A|B)$

(B) $H(A, B) = I(A|B) - H(A) - H(B)$

(C) $H(A, B) = H(A) - H(B) + I(A|B)$

(D) $H(A, B) = H(B) - H(A) + I(A|B)$

68. Information rate of BCH code of length 15 and having 128 code words is :

(A) $\frac{1}{5}$

(B) $\frac{7}{15}$

(C) $\frac{15}{7}$

(D) None of the above

69. For the Hamming Code having the following parity check matrix :

$$\begin{bmatrix} 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 & 1 & 0 & 1 \end{bmatrix}$$

If the received vector is (1001000), then the error is at location :

(A) 3

(B) 4

(C) 5

(D) 6

70. In LZW coding image is processed from :

(A) Left to right, top to bottom

(B) Right to left, top to bottom

(C) Left to right, bottom to top

(D) None of the above

71. A simplex in one dimension is a :

(A) Point

(B) Line

(C) Curve

(D) None of these

72. In simplex method the unbounded solution is indicated by the (column) variable for entry into basis with :

(A) $y_{ij} = 0$

(B) $y_{ij} > 0$

(C) $y_{ij} \leq 0$

(D) None of these

73. If primal LP problem has two equality constraints then the corresponding dual problem has unrestricted variables.

(A) 1

(B) 2

(C) 3

(D) 4

74. If for an assignment problem all $c_{ij} \geq 0$, then the assignment schedule x_{ij} which satisfies $\sum \sum x_{ij} c_{ij} = 0$:

(A) is optimal

(B) requires improvement

(C) does not mean anything

(D) none of the above

75. Dijkstra's algorithm for finding shortest path in a graph with 'v' vertices and 'e' edges is of the order :

(A) $O(|e|^2)$

(B) $O(|e|)$

(C) $O(|v|)$

(D) $O(|v|^2)$