Test Booklet Series

A

Test Booklet No.

Test Booklet for the Post of

Assistant Professor Computer Science & Engineering

Name of Applicant ..... Answer Sheet No. .....

Applicant ID/Roll No. : ..... Signature of Applicant : .....

Date of Examination: .....

Signature of the Invigilator(s)

1. .....

Time of Examination : .....

2. .....

Duration : 1 Hour] **[Maximum Marks : 50**

IMPORTANT INSTRUCTIONS

(i) The question paper is in the form of Test-Booklet containing **50 (Fifty)** questions. All questions are compulsory. Each question carries four answers marked (A), (B), (C) and (D), out of which only one is correct. Choose the correct option or the most appropriate option.

(ii) On receipt of the Test-Booklet (Question Paper), the candidate should immediately check it and ensure that it contains all the pages, i.e., **50** questions. Discrepancy, if any, should be reported by the candidate to the invigilator immediately after receiving the Test-Booklet.

(iii) A separate Answer-Sheet is provided with the Test-Booklet/Question Paper. On this sheet there are **50** rows containing four circles each. One row pertains to one question.

(iv) The candidate should write his/her Application ID/Roll number at the places provided on the cover page of the Test-Booklet/Question Paper and on the Answer-Sheet and NOWHERE ELSE.

(v) No second Test-Booklet/Question Paper and Answer-Sheet will be given to a candidate. The candidates are advised to be careful in handling it and writing the answer on the Answer-Sheet.

(vi) For every correct answer of the question **One (1) mark will be awarded.** There will be negative marking and 1/4 (0.25) mark will be deducted for every incorrect answer.

(vii) Marking shall be done only on the basis of answers responded on the Answer-Sheet.

(viii) To mark the answer on the Answer-Sheet, candidate should **darken** the appropriate circle in the row of each question with Blue or Black pen.

(ix) For each question only **one** circle should be **darkened** as a mark of the answer adopted by the candidate. If more than one circle for the question are found darkened or with one black circle any other circle carries any mark, the answer will be treated as incorrect.

(x) The candidates should not remove any paper from the Test-Booklet/Question Paper. Attempting to remove any paper shall be liable to be punished for use of unfair means.

(xi) Rough work may be done on the blank space provided in the Test-Booklet/Question Paper only.

(xii) *Mobile phones (even in Switch-off mode) and such other communication/programmable devices are not allowed inside the examination hall.*

(xiii) No candidate shall be permitted to leave the examination hall before the expiry of the time.

DO NOT OPEN THIS QUESTION BOOKLET UNTIL ASKED TO DO SO.

1. In a circular queue implemented using an array, assume the array is of size n. Given that the front pointer is at index i and the rear pointer is at index j, which of the following conditions correctly represents a full queue?

(A) (j+1)%n==i

(B) (j+1)%n==i–1

(C) (i+1)%n==j

(D) j==i

2. Pigeonhole principle states that A $\rightarrow$ B and $|A| > |B|$ then :

(A) f is not onto

(B) f is not one-one

(D) f may be one-one

(C) f is neither one-one nor onto

3. What output will be generated by the following code:

```
main(){
int a, b, c;
a = 20;
b = a++;
c = ++b;
printf("%d %d %d",a,b,c);
}
```

(A) 20 21 22

(B) 20 21 21

(C) 21 21 21

(D) 20 20 21

4. The goal of hashing is to produce a search that takes

(A) *O(1)* time

(B) $O(n^2)$ time

(C) *O(log n)* time

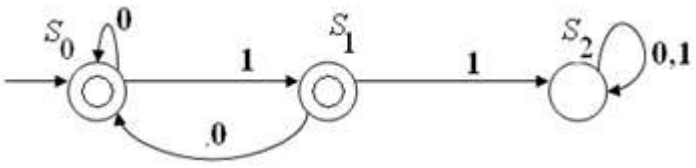
(D) *O(n log n)* time

5. The Boolean expression $AB + A\overline{B} + \overline{A}C + AC$ is unaffected by the value of the Boolean variable :

(A) A (B) B

(C) C (D) A, B, and C

6. What kind of strings is rejected by the following automaton?



(A) All strings with two consecutive zeros

(B) All strings with two consecutive ones

(C) All strings with alternate 1 and 0

(D) None of these

7. The Functional Dependencies $X \rightarrow Y$, $YZ \rightarrow W$ imply :

(A) $XZ \rightarrow W$ (B) $Y \rightarrow X$

(C) $X \rightarrow W$ (D) $YZ \rightarrow X$

8. What will be the number of columns and rows respectively obtained for the operation, A-B, if A, B are Base union compatible and all the rows of A are common to B? Assume A has 4 columns and 10 rows; and B has 4 columns and 15 rows

(A) 4,0 (B) 0,0

(C) 4,5 (D) 8,5

9. Which is not the correct statement(s)?

(i) Every context sensitive language is recursive.

(ii) There is a recursive language that is not context sensitive.

(A) (i) is true, (ii) is false.

(B) (i) is true and (ii) is true.

(C) (i) is false, (ii) is false.

(D) (i) is false and (ii) is true.

10. Number of binary trees formed with 5 nodes are :

(A) 32

(B) 36

(C) 120

(D) 42

11. Consider a schema R(A, B, C, D) and functional dependencies A $\rightarrow$ B and C $\rightarrow$ D. Then the decomposition R1(A, B) and R2(C, D) is

(A) Dependency preserving but not lossless join

(B) Dependency preserving and lossless join

(C) Lossless Join but not dependency preserving

(D) Lossless Join

12. What is the result of the following C expression : (1&2)+(3/4) ?

(A) 1

(B) 2

(C) 3

(D) 0

13. In classful addressing, the IP address 190.255.254.254 belongs to

(A) Class A

(B) Class B

(C) Class C

(D) Class D

14. Usage of Preemption and Transaction Rollback prevents :

(A) Unauthorized usage of data file

(B) Deadlock situation

(C) Data manipulation

(D) File preemption

15. The hit ratio of a Translation Look Aside Buffer (TLAB) is 80%. It takes 20 nanoseconds (ns) to search TLAB and 100 ns to access main memory. The effective memory access time is :

(A) 36 ns

(B) 140 ns

(C) 122 ns

(D) 40 ns

16. Given the IP address 201.14.78.65 and the subnet mask 255.255.255.224. What is the subnet address?

(A) 201.14.78.32

(B) 201.14.78.64

(C) 201.14.78.65

(D) 201.14.78.224

17. A regular grammar for the language $L = \{a^n b^m \mid n \text{ is even and } m \text{ is even}\}$ is given by

(A) $S \rightarrow aSb \mid S1;\ S1 \rightarrow bS1a \mid \lambda$

(B) $S \rightarrow aaS \mid S1;\ S1 \rightarrow bSb \mid \lambda$

(C) $S \rightarrow aSb \mid S1;\ S1 \rightarrow S1ab \mid \lambda$

(D) $S \rightarrow aaS \mid S1;\ S1 \rightarrow bbS1 \mid \lambda$

18. Which of the following statements is false?

(A) Any relation with two attributes is in BCNF.

(B) A relation in which every key has only one attribute is in 2NF.

(C) A prime attribute can be transitively dependent on a key in 3NF relation.

(D) A prime attribute can be transitively dependent on a key in BCNF relation.

19. Let R = {A, B, C, D, E, F} be a relation schema with the following dependencies $C \rightarrow F$, $E \rightarrow A$, $EC \rightarrow D$, $A \rightarrow B$; Which of the following is a key for R ?

(A) CD (B) EC

(C) AE (D) AC

20. The output of a sequential circuit depends on

(A) present input only (B) past input only

(C) both present and past input (D) past output only

21. Given the following expressions of a grammar

$E \rightarrow E * F / F + E / F$

$F \rightarrow F - F / id$

Which of the following is true ?

(A) * has higher precedence than + (B) – has higher precedence than *

(C) + and – have same precedence (D) + has higher precedence than *

22. The problem of indefinite blockage of low-priority jobs in general priority scheduling algorithm can be solved using :

(A) Parity bit (B) Aging

(C) Compaction (D) Timer

23. The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is known as

(A) Bit stuffing (B) Piggy backing

(C) Pipelining (D) Broadcasting

24. Which of the following regular expression identities are true ?

(A) $(r + s)^* = r^* s^*$

(B) $(r + s)^* = r^* + s^*$

(C) $(r + s)^* = (r^* s^*)^*$

(D) $r^* s^* = r^* + s^*$

25. If the queue is implemented with a linked list, keeping track of a front pointer and a rear pointer, which of these pointers will change during an insertion into a queue ?

(A) Neither of the pointers change

(B) Only front pointer changes

(C) Only rear pointer changes

(D) Both of the pointers may change

26. Given two sorted list of size 'm' and 'n' respectively. The number of comparison needed in the worst case by the merge sort algorithm will be

(A) $m \times n$

(B) max (m, n)

(C) min (m, n)

(D) $m + n - 1$

27. The compiler converts all operands upto the type of the largest operand is called

(A) Type Promotion

(B) Type Evaluation

(C) Type Conversion

(D) Type Declaration

28. Given the following probabilities : $P(A) = 0.3$, $P(B) = 0.4$, and $P(A \cap B) = 0.1$, what is $P(A \mid B)$?

(A) 0.1

(B) 0.25

(C) 0.3

(D) 0.75

29. Consider that n elements are to be sorted. What is the worst case time complexity of Bubble sort?

(A) O(1)

(C) O(n)

(B) $O(\log_2 n)$

(D) $O(n^2)$

30. An algorithm is made up of two independent time complexities f (n) and g (n). Then the complexities of the algorithm is in the order of

(A) f(n) x g(n)

(B) Max (f(n), g(n))

(C) Min (f(n), g(n))

(D) f(n) + g(n)

31. Let E1 and E2 be two entities in E-R diagram with simple single valued attributes. R1 and R2 are two relationships between E1 and E2 where R1 is one-many and R2 is many - many. R1 and R2 do not have any attributes of their own. How many minimum number of tables are required to represent this situation in the relational model?

(A) 4

(B) 2

(C) 1

(D) 3

32. A 4-bit synchronous counter uses flip-flops with propagation delay times of 15 ns each. The maximum possible time required for change of state will be

(A) 15 ns.

(B) 30 ns.

(C) 45 ns.

(D) 60 ns.

33. In distance vector routing protocols, what mechanism is used to avoid the count-to-infinity problem?

(A) Split horizon

(B) Spanning Tree Protocol

(C) Link state advertisement

(D) Flooding

34. Which of the following protocols is used by email clients to retrieve messages from a mail server?

(A) SMTP

(B) POP3

(C) FTP

(D) HTTP

35. Replacing code

*for (int i = 0; i < n; i++) { int x = a * b; array[i] = x + i;}*

by

*int x = a * b; for (int i = 0; i < n; i++) { array[i] = x + i;}*

is an example of :

(A) Frequency reduction

(B) Strength reduction

(C) Common sub-expression elimination

(D) Dead code elimination

36. Which of the following statements is/are FALSE?

1. For every non-deterministic Turing machine, there exists an equivalent deterministic Turing machine.
2. Turing recognizable languages are closed under union and complementation.
3. Turing decidable complementation languages are closed under intersection
4. Turing recognizable languages are closed under union and intersection.

(A) 1 and 4 only

(B) 1 and 3 only

(C) 2 only

(D) 3 only

37. The smallest integer than can be represented by an 8-bit number in 2's complement form is

(A) –256

(B) –128

(C) –127

(D) –255

38. Consider a two dimensional array A[30][20]. Assume 4 words per memory cell, the base address of array A is 500, elements are stored in row-major order and first element is A[0][0]. What is the address of A[13][6] ?

(A) 1916

(B) 1564

(C) 1764

(D) 1516

39. Arrange the following parsers according to their power from smallest to largest.

1. LR(0)
2. CLR(1)
3. SLR(1)
4. LALR(1)

(A) 1, 2, 3, 4 (B) 1, 3, 4, 2

(C) 2, 1, 4, 3 (D) 1, 3, 2, 4

40. In a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space and a page size of 2^{10} bytes, how many bits are in logical address?

(A) 4 (B) 14

(C) 18 (D) 10

41. The problem of starvation can occur in which of the following scheduling algorithms :

1. Shortest Remaining Time First
2. First Come First Serve
3. Round Robin
4. Priority
5. Shortest Job Next

(A) 1, 2 and 5 only (B) 2, 3 and 4 only

(C) 1, 4 and 5 only (D) 1, 2 and 4 only

42. Consider the following statements w.r.t. a graph G(V, E) :

1. A graph in which there is a unique path between every pair of vertices is a tree
2. A connected graph with E = V – 1 is a tree
3. A graph with E = V – 1 that has no circuit is a tree

Which of the above statements is/are true?

(A) 1 and 3 only (B) 2 and 3 only

(C) 1 and 2 only (D) 1, 2 and 3

43. Given below are two statements :

Statement-I : If the number of stages in the instruction pipeline increases then the degree of parallelism decreases due to the increased complexity of the pipeline.

Statement-II : Hardwired control unit is rigid but faster as compared to multi-programmed control unit.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both Statement-I and Statement-II are correct

(B) Both Statement-I and Statement-II are incorrect

(C) Statement-I is correct and Statement-II is incorrect

(D) Statement-I is incorrect and Statement-II is correct

44. The throughput of slotted ALOHA is given by

(A) $S = G$ (B) $S = Ge^{G}$

(C) $S = Ge^{-G}$ (D) $S = e^{G}$

45. n wait-die scheme, transactions T1 and T2 have timestamps 6 and 13 respectively. If T1 request a data item held by T2 then

(A) T1 will be rolled back (B) T2 will be rolled back

(C) T1 will wait (D) T2 will wait

46. Consider the below relations:

1. $R (A, B, C, D)$ & $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow D\}$
2. $R (A, B, C, D, E)$ & $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$
3. $R (A, B, C, D)$ & $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow A\}$

Arrange the above relations w.r.t. the number of candidate keys they have in ascending order. Choose the correct answer from the below options only :

(A) 1, 2, 3 (B) 2, 1, 3

(C) 2, 3, 1 (D) 1, 3, 2

47. What will be the output of the following "C" code :

```
union ex{
    int a;
    int b;
    int c;
};
int main() {
union ex u1;
u1.a = 30;
u1.b = 50;
u1.c = u1.a + u1.b;
printf("%d, %d, %d", u1.a, u1.b, u1.c);
return 0;
}
```

(A) 30, 50, 80

(B) 50, 50, 100

(C) 30, 50, 100

(D) 100, 100, 100

48. At a particular time of computation, the value of a counting semaphore is 7. Then 20 P operations and 'X' V operations were completed on this semaphore. If the final value of the semaphore is 5 then value of X will be

(A) 15

(B) 22

(C) 18

(D) 23

49. Match List-I with List-II :

	LIST-I		LIST-II
a.	802.3	1.	Wireless LAN
b.	802.11	2.	Bluetooth
c.	802.15	3.	Ethernet
d.	802.16	4.	Wireless WAN

Select the correct answer from the options given below :

(A) a-3 b-2 c-1 d-4

(B) a-1 b-4 c-3 d-2

(C) a-2 b-1 c-4 d-1

(D) a-3 b-1 c-2 d-4

50. The total number of spanning trees possible with 6 nodes are :

(A) 1296 (B) 15

(C) 132 (D) 2^{15}

ROUGH WORK

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