

1. Let L be any CFL. Then there is a constant n, depending only on L such that if z is in L and $|z| \geq n$, then we may write $z = uvwxy$, then the following does not hold
 - A> $\forall x=0$
 - B> $\forall x \geq 1$
 - C> $\forall wx \leq n$
 - D> For all $i \geq 0$ uv^iwx^iy is in L
 - E> None of the above

2. Let L be a CFL. Then there is a constant n such that if z is any word in L, and we mark any n or more positions of z “distinguished”, then we can write $z=uvwxy$, then which of the following is not valid
 - A> v and x together have at least one distinguished positions
 - B> vwx has at most n distinguished positions
 - C> for all $i \geq 0$, uv^iwx^iy is in L
 - D> None of the above

3. A turning machine is multitape whose input tape is read-only is called
 - A> On line
 - B> Off-line
 - C> Take-line
 - D> Back space
 - E> None of the above

4. A deterministic Turing machine with a read only input and two storage tapes is called
 - A> Mono stack machine
 - B> Deterministic two-stack machine
 - C> Two state device
 - D> None of the above

5. A problem whose language is recursion is called
 - A> Unified problem
 - B> Boolean function
 - C> Recursive problem
 - D> decidable
 - E> None of the above

6. Which of the following statement is correct?
 - A> The CFL's are open under homomorphism
 - B> The CFL's are bounded under homomorphism
 - C> The CFL's are closed under homomorphism
 - D> The CFL's are not closed under union
 - E> None of the above

7. Which of the following statement is not valid?
 - A> The CFL's are closed under homomorphism

- B> The CFL's are not closed under intersection
- C> The CFL's are not closed under homplementation
- D> If L is CFL and R is a regular set, then $L \cup R$ is a CFL
- E> None of the above

8. What does the following block diagram show ?

- A> Bounded CFA
- B> Bounded CFL
- C> Running an FA and PDA in parallel
- D> All of the above
- E> None of the above

9. The linear languages are closed under

- A> Union
- B> Homomorphism
- C> Intersection with a regular set
- D> All the above are valid
- E> None of the above

10. For a multi-tape Turing machine, on a single move depending on the state of the finite control and the symbol scanned by each of the tape heads, what does the machine can not do?

- A> Change state
- B> Print a new symbol on each of the cells scanned by its tape heads
- C> Move each of its tape heads, independently one cell to the left or right
- D> Not to keep it stationary
- E> None of the above

11. A Turing machine can simulate a RAM, provided that the elementary RAM instructions can themselves be simulated by a

- A> ROM
- B> RAM
- C> CD
- D> TM
- E> None of the above

12. If L is an r.e. set, then there is a generator for L that enumerates each word in L

- A> Exactly twice
- B> Exactly once

- C> Exactly thrice
- D> None of the above

13. If a function has finite number of applications of composition and primitive recursion applied to constant 0, the successor function or projection function $P_i(x_1, \dots, x_n) = x_i$ is called

- A> Projective function
- B> Recursive function
- C> Context language
- D> Primitive recursive function
- E> None of the above

14. Which of the following properties of r. e. sets are not decidable ?

- A> Emptiness
- B> Finiteness
- C> Regularity
- D> All of the above
- E> None of the above

15. Which of the following statement is not true ?

- A> If L is in \mathcal{L} and $L \leq L'$ for some r.e. L' , then L' is in \mathcal{L}
- B> If L is an infinite languages in \mathcal{L} , then there is a finite subset of L in \mathcal{L}
- C> The set of finite languages in \mathcal{L} is countable
- D> The set of finite languages in \mathcal{L} is uncountable
- E> None of the above

16. Which of the following properties of r.e. sets are r.e.

- A> $L = \bar{L}$
- B> $L = \bar{\bar{L}}$
- C> $L = \bar{L}$
- D> $L = \bar{\bar{L}}$
- E> None of the above

17. Which of the following properties of r.e. sets are not r.e.

- A> $L = \bar{L}$
- B> $L = \bar{\bar{L}}$
- C> $L = \bar{L}$
- D> $L = \bar{\bar{L}}$
- E> None of the above

18. Let G_1 and G_2 be arbitrary CFG's and R an arbitrary regular set. Which of the following problems are undecidable ?

- A> $G_1 \cap G_2 = R$
- B> $G_1 \cup G_2 = R$
- C> $G_1 \cap R = R$
- D> All of the above
- E> None of the above

19. For any total recursive function there exists an x_0 such that, for all x .

- A> $f(x) > x$

- B>
- C>
- D> All of the above
- E> None of the above

20. Which of the following properties of r.e. sets are themselves r.e. ?

- A> L contains atleast two strings
- B> L is infinite
- C> L is a context-free language
- D> $L=L^R$
- E> None of the above

21. What does the following figure show ?

- A> NFA [0 1]
- B> NFA accepting $0(10)^*$
- C> NFA accepting $0[01]^*$
- D> NFA accepting $[a01]$
- E> None of the above

22. Which of the following CSL's are closed under the following operations:

- A> Union
- B> Concatenation
- C> Intersection
- D> All of these
- E> None of the above

23. Every DCFL is $L(M)$ for a DPDA- $M=(Q, \dots)$ such that if

- A>
- B>
- C>
- D> All of the above
- E> None of the above

24. Let L be a DCFL and R a regular set. Which of the following problems is decidable?

- A> $L \dots R$
- B> $R \leq L$
- C> $L \dots$
- D> L is irregular
- E> None of the above

25. Let L and L' be arbitrary DCFL's. Then which of the following is undecidable ?

- A>

- B>
- C>
- D> All of the above
- E> None of the above

26. If the family of language is closed under all homomorphisms, as well as inverse homomorphism and intersection with a regular set, then it is said to be

- A> Full trio
- B> Link language
- C> C.F.L.
- D> D.F.L.
- E> None of the above

27. Trios are closed under substitution by a free regular sets, and full trios are closed under substitution by

- A> Null set
- B> Finite sets
- C> Regular sets
- D> Infinite sets
- E> None of the above

28. If L is in $NSPACE(S(n))$, then L is in $NSPACE(cS(n))$; where C is any constant.

- A> ≥ 0
- B> > 0
- C> $= 0$
- D> < 0
- E> None of the above

29. Let $f(n)=1/n \forall n$ Even, $f(n)=n$ for n odd. The lub of $f(n), f(n+1), \dots$ is clearly ..for any n , because of the term of odd n .

.....

- A> ≥ 0
- B> $= 0$
- C> < 0
- D> ≤ 0
- E> None of the above

30. There is a language in $DTIME(T_2(n))$ but not $DTIME(T_1(n))$, if $T_2(n)$ is a fully time constructible function and then

- A> 1
- B> 0
- C> 2
- D> -1
- E> None of the above

31. From Q. 30. Let $T_1(n)=2^n$ and $T_2(n)=n^2 2^n$ then

inf

A> 1

B> 2

C> 0

D> -1

E> None of the above

32. If L is in NSPACE ($s(n)$), then L is in DSPACE ($S^2(n)$) provided $S(n)$ is fully space constructable and

A> $S(n)=\log 2^n$

B> $S(n)>\log 2^n$

C> $S(n)\geq\log 2^n$

D> $S(n)\leq\log 2^n$

E> None of the above

33. From Q. 30. The value of inf.....is

A> 1

B> -1

C> +-1

D> 0

E> None of the above

34. If $Q=\max(m,n)$ and B is a square submatrix of A then

A> $\det B = 0$

B> $\det B \leq (\alpha q)^q$

C> $\det B \geq 0$

D> $\det B = (\alpha q)^{q+1}$

E> None of the above

35. Let A have rank r , If $r < n$, then there is an integer vector $z=(z_1, z_2, \dots, z_n)$, z not identically zero, such that $Az=0$ (0 is a vector of all 0's) and no z_j exceeds $(\alpha q)^{2q}$ in magnitude, where q is

A> ≥ 0

B> $\max(m,n)$

C> $\min(m,n)$

D> ${}^m C_n$

E> None of the above

36. Assume that the non-deterministic time to recognize that P is a prime is bounded by $C \log^4 p$. Then

A>

B>

C>

D> All of the above

E> None of the above

37. what does the following figure show?

- A> ADFA
- B> APDA
- C> DTIME(S)
- D> All of the above
- E> None of the above

38. The Digraphs that have at most one directed edge between a pair of vertices, but are allowed to have self loops, are called

- A> Symmetric digraphs
- B> Anti-symmetric digraphs
- C> Simple digraphs
- D> Complete digraphs
- E> None of the above

39. A vertex v in a digraph is called pendant if it is of degree one i.e.,
 $d^+(v) + d^-(v)$ is equal to

- A> 0
- B> 1
- C> -1
- D> +-1
- E> None of the above

40. The non-empty intersection of two fundamental circuits in a graph is always a

- A> path
- B> graph
- C> subgraph
- D> vertex
- E> None of the above

41. The vertices in a digraph can be arranged in a topological order if and only if the digraph is

- A> cyclic
- B> coinyclic
- C> linear
- D> vertical
- E> None of the above

42. A digraph in which the edge weights are positive quantities and the sum of weights of edges emanating from a vertex is unity is called
- A> Pirated graph
 - B> Coincident graph
 - C> Stochastic graph
 - D> matrix
 - E> None of the above
43. Data definition language(DDL)
- A> Describes how data are structured in the database
 - B> Specified for the DBMS what is required ; the techniques used to process data
 - C> Determine how data must be structured to produce the user view
 - D> All the above are true for DDL
 - E> None of the above
44. Many data communication networks have been established which provide a wealth of on demand information services to people at home. What is the name of the system, which provides an interactive, graphics-rich service that permits user to select what they want?
- A> Teleflex system
 - B> Fax system
 - C> Vodolex system
 - D> Microwave system
 - E> None of the above
45. To be successful in implementing DSS, organizations should have the following characteristic except:
- A> A well controlled data-processing system
 - B> Willingness to commit dollars and personnel to the project
 - C> Education and training by the organization
 - D> Powerful central computer groups to initiate and manage system projects
 - E> None of the above
46. Which is earliest and most widely used shell that come with the UNIX system?
- A> C shell
 - B> Kon shell
 - C> Bourne shell
 - D> Smith shell
 - E> None of the above
47. Let A and B sets with # A = M and # B = n. The number of on-one mappings(injections) from A to B, when $m < n$ is
- A> m^n
 - B> ${}^n P_m$
 - C> ${}^m C_n$
 - D> ${}^n C_m$

E> None of the above

48. Any relation $R(A,B,C)$ satisfies $JD^*(AB, AC)$ iff

A> $A \rightarrow \rightarrow B/C$

B> $A \rightarrow \rightarrow C/B$

C> $A \rightarrow \rightarrow C$

D> $A \rightarrow \rightarrow B$

E> None of the above

49. Which of the following is not used with the LINAGE clause ?

A> AT EOP

B> AT TOP

C> AT BOTTOM

D> All of the above

E> None of the above

50. A palindrome can be defined as a string that read the same forward and backward or by the following

A> ϵ is a palindrome

B> If a is any symbol, then the strings a is not a palindrome

C> If a is any symbol and x is a palindrome, then axa is not a palindrome

D> All of the above are true

E> None of the above

Answer Sheet for question no. TOTSOL-FA-02

1. A
2. D
3. B
4. B
5. D
6. C
7. D
8. C
9. D
10. D
11. D
12. B
13. D
14. D

- 15. D
- 16. C
- 17. C
- 18. C
- 19. C
- 20. C
- 21. B
- 22. D
- 23. C
- 24. B
- 25. B
- 26. A
- 27. C
- 28. B
- 29. B
- 30. B
- 31. C
- 32. C
- 33. A
- 34. B
- 35. B
- 36. A
- 37. B
- 38. B
- 39. A
- 40. A
- 41. A
- 42. C
- 43. A
- 44. C
- 45. D
- 46. B
- 47. B
- 48. B
- 49. A
- 50. A