1. Which of the following may appear in stack during parsing of the language defined by following grammar?

$S \rightarrow aAd$ , $A \rightarrow bc$

(a) abc
(b) bcd
(c) abcd
(d) None of the above

2. Huffman Algorithm for constructing optimal prefix code is an example of:

(a) Divide and Conquer Algorithm
(b) Greedy Algorithm
(c) Dynamic Programming
(d) Backtracking

3. Suppose P1 and P2 are two patterns such that their supporting transaction sets are $T(P1) = (t_1, t_2, t_3, t_4, t_5)$ and $T(P2) = (t_1, t_2, t_3, t_4, t_6)$ where $t_i$ is a transaction in the database. The pattern distance between P1 and P2, Pat_Dist (P1, P2) is:

(a) 1/3
(b) 1/2
(c) 2/3
(d) 1

4. For a given classification system with confusion matrix as follows:

| | Yes T | No N |
|---|---|---|
| Yes T | 90 | 180 |
| No N | 140 | 810 |

Precision for Yes class is:

(a) 10%
(b) 33.33%
(c) 35%
(d) 39.13%

5. The running time of Dijkstra's Algorithm for solving Single Source Shortest Path problem in a Graph G= (V,E) with binary min. Heap implementation of min priority queue is:

(a) $O(E^2)$
(b) $O(V^2)$
(c) $O((V+E) \log V)$
(d) $O(E^2+V^2 \log V)$

6. Kruskal's Algorithm for finding Minimum Spanning tree is an example of:

(a) Divide and Conquer Algorithm
(b) Greedy Algorithm
(c) Dynamic Programming
(d) Backtracking

7. If a tree T has five vertices of degree 2, three vertices of degree 3 and four vertices of degree 4, then the number of vertices in the tree T with degree 1 is:

(a) 12
(b) 13
(c) 14
(d) 15

8. An Analog to Digital Converter ADC which does not use Digital to Analog Converter is:

(a) Successive Approximation ADC
(b) Digital Ramp ADC
(c) Flash ADC
(d) Up/Down Digital Ramp ADC

9. Minimum number of states used in a state diagram of a restarting Mealy sequence detector that detects a sequence "10110":

(a) 4 States (b) 5 States
(c) 6 States (d) 7 States

10. Time required by the input signal of a memory to be stable before the active edge of the clock is called:

(a) Setup time (b) Start-up time
(c) Cooling time (d) Refresh time



11. Number of PMOS Transistor used to implement the function $F = AB + C$ is:

(a) 6 (b) 4
(c) 2 (d) 3

12. The input block length in AES is:

(a) 128 bits (b) 16 bits
(c) 32 bytes (d) 64 bits

13. If the word LOGIC VALUE is encrypted (coded) as JMEGA TYJSC what is the encryption of BASE TRANSFER?

(a) ZYQC RPYLQDCP (b) AZPB QOXKPCBO
(c) ZAFG RMNKODGP (d) SWJI FJPKODIP



14. Consider following grammar (S is starting variable) recognizing expressions over binary operator $ and &, and operand id –

S → S & A S → A A → A $ B A → B B → id

Which of the following is TRUE about the above grammar?

(a) Precedence of & is more than $ (b) Precedence of $ is more than &
(c) Precedence of & and $ are equal (d) Grammar is ambiguous and hence precedence can't be determined

15. Which of the following grammar recognizes all strings of balanced parentheses?

(a) $S \rightarrow (S)\, S \mid \varepsilon$ (b) $S \rightarrow (S \mid S) \mid \varepsilon$
(c) $S \rightarrow (S) \mid \varepsilon$ (d) $S \rightarrow (S)\,(S) \mid \varepsilon$

16. Consider the following statements:



I. Recursive languages are closed under complementation
II. Recursively enumerable languages are closed under union
III. Recursively enumerable languages are closed under complementation

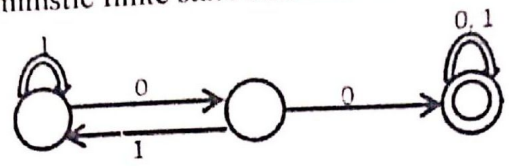
which of the following statement is TRUE?

(a) Only I (b) I and II
(c) I and III (d) II and III

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Z X Q C

17. Consider a following deterministic finite state automaton M




Let S denote the set of seven binary bit strings in which first, fourth and last bits are 1. The number of strings in S that are accepted by M is:

(a) 1
(b) 5
(c) 7
(d) 8

1, 2, 3, 4, 5, 6, 7
1 0 0 1 1



18. Which of the following is true?

(a) The complement of a recursive language is recursive
(b) The complement of a recursively enumerable language is recursively enumerable
(c) The complement of a recursive language is either recursive or recursively enumerable
(d) The complement of a context-free language is context-free

19. Consider following grammar

$S \rightarrow aA|aB$

$A \rightarrow d$

$B \rightarrow g$

aA aB
a B



which of the following is true for above grammar?

(a) Grammar is left recursive
(b) Grammar is ambiguous
(c) Grammar is not LL(1)
(d) Grammar is not LR(0)

20. Two issues to consider with the computation required to use RSA are encryption / decryption and _____

(a) time complexity
(b) trap-door one-way functions
(c) key generation
(d) asymmetric encryption padding

21. Which of the following protocol can be used as a mail access protocol?

(a) File Transfer Protocol (FTP)
(b) Open Shortest Path First Protocol (OSPF)
(c) Simple Mail Transfer Protocol (SMTP)
(d) Hyper-Test Transfer Protocol (HTTP)

22. In TCP flow control, the receive window denoted by rwnd is set to the amount of spare room in the buffer:



(a) rwnd = LastByteRcvd – [RcvBuffer – LastByteRead]
(b) rwnd = RcvBuffer – [LastByteRcvd – Last ByteRead]
(c) rwnd = LastByteRead – [RcvBuffer – LastByteRcvd]
(d) rwnd = RcvBuffer + [LastByteRcvd – Last ByteRead]

23. In addition to other fields in a GET message, a conditional GET message contains

(a) Date
(b) Last-modified
(c) If-modified-since
(d) Host

24. Let us consider how long it takes to send a file of size 640,000 bits from Host A to Host B over a circuit switched network. Suppose that all links in the network use 24 slots and have a bit rate of 3.072 Mbps. Also suppose that it takes 500 milliseconds to establish an end-to end circuit before Host A can begin to transmit the file. How long does it take to send the file?

(a) 10.5 seconds
(b) 5.5 seconds
(c) 20.5 seconds
(d) 15.5 seconds

25. Let there be three page frames. What is the number of page faults for the following reference string of page numbers using OPT page replacement policy?

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

(a) 8
(b) 9
(c) 10
(d) 11

26. Which of the following is not a necessary requirement to be satisfied by a solution to the critical section problem?

(a) Mutual exclusion
(b) No preemption
(c) Progress
(d) Bounded waiting

27. Let there be five processes with the following arrival and burst times

| Process | Arrival Time | Burst Time |
|---|---|---|
| $P_0$ | 1 | 7 |
| $P_1$ | 3 | 3 |
| $P_2$ | 6 | 2 |
| $P_3$ | 7 | 10 |
| $P_4$ | 9 | 8 |

What is the average turnaround time using Shortest Job First (SJF) Non-preemptive scheduling policy?

(a) 10.4
(b) 11.4
(c) 12.4
(d) 13.4

28. In axiomatic system, logical expression $A \wedge B$ is equivalent to:

(a) $(\sim A \rightarrow B)$
(b) $\sim (A \rightarrow \sim B)$
(c) $(A \rightarrow \sim B)$
(d) $(\sim A \rightarrow \sim B)$

29. ID3 is a decision tree induction algorithm to classify training data. If $p_1$ is defined as the proportion of training data that includes positive examples and $p_0$ is defined as the proportion of training data that includes negative examples. The information gain (as the reduction in entropy) defined as H(s) is

(a) $H(s) = -p_1 \log_2 p_1 - p_0 \log_2 p_0$
(b) $H(s) = -p_0 \log_2 p_1 - p_1 \log_2 p_0$
(c) $H(s) = p_1 \log_2 p_1 - p_0 \log_2 p_0$
(d) $H(s) = p_0 \log_2 p_1 + p_1 \log_2 p_0$

30. Multi-layered back propagation network usually uses the following as an activation function:

(a) Signum function
(b) Sigmoid function
(c) Step function
(d) Hyperbolic-tangent function

31. A situation calculus is a form of:
(a) Differential calculus
(b) Propositional calculus
(c) First order predicate calculus
(d) Situation analysis

32. In AI problem solving methods, the order of application of the rules to the current state is known as:
(a) Control Flow
(b) Algorithm
(c) Control Strategy
(d) Chaining

33. Problem solving approaches having the judgmental and commonsense part is known as:
(a) Heuristics
(b) Commonsense reasoning
(c) Planning
(d) Analytics

34. Which of the following statement is false?
(a) Phong shading is much slower than Gouraud shading
(b) Gouraud shading does not handle specular reflections very well
(c) Phong shading produces highlights which are much less dependent on the underlying polygons
(d) Phong shading linearly interpolates the vertex intensities over the projected area of the polygon

35. Following is not an advantage of LCD panels?
(a) Light weight
(b) Low power consumption
(c) Good brightness at low temperatures
(d) Wide viewing angle

36. Software Usability can be measured in terms of:
(a) Mean Time Between Failure
(b) Time required to become moderately efficient in system usage
(c) Net decrease in productivity
(d) None of the above

37. An approach to testing where the testers have no access to the source code of a system or its components and the tests are derived from the system specification is called as:
(a) White Box Testing
(b) Black Box Testing
(c) Glass Box Testing
(d) None of the above

38. In Software Engineering, CMM stands for:
(a) Capacity Monitoring Method
(b) Capability Maturity Model
(c) Component Maturity Method
(d) Capability Monitoring Model

39. Which software process model is best for handling unforeseen risks?
(a) Prototyping
(b) Incremental model
(c) Spiral model
(d) Rapid Application Development

40. In Painter's Algorithm for hidden surface removal
(a) Polygons have to be sorted according to their depth
(b) Polygons can be rendered in any order
(c) Oil paint is recommended for painting landscapes
(d) Near objects appear larger than farther objects