PET Computer Science

18-04-2015

QP Code : 22222

(3 Hours) [Total Marks: 100

Note:

1. Section I contains 40 Multiple Choice Questions. Attempt all. Each question carries 1 mark.
2. Section II contains FIVE questions. Attempt any THREE. Each question carries 10 marks.
3. Section III contains THREE questions. Attempt any TWO. Each question carries 15 marks.

SECTION – I

1 Which of the following features an artificial neural network can demonstrate
- A) Associate memory, fault tolerance but not concept learning
- B) Associate memory, concept learning but not fault tolerance
- C) Concept learning, fault tolerance but not associate memory
- D) Associate memory, fault tolerance and concept learning

2 Bottom up parser involves
A) Shift reduce B) Handle pruning C) Operator check D) Both A) and B)

3 Most simulation models are
- A) Random variables based on random inputs
- B) Random variables based on fixed inputs
- C) Fixed variables based on random inputs
- D) Fixed variables based on fixed inputs

4 Example of discontinuity approach in image segmentation is
A) Edge based segmentation B) Boundary based segmentation
C) Region based segmentation D) Both A) and B)

5 A DSP convolves each discrete sample with four coefficients and they are all equal to 0.25. This must be a
A) IIR filter B) FIR filter C) RRR filter D) All of these

6 Replication of data in distributed database reduces reliability. The statement is
A) True B) False C) May be True D) Cannot say

7 The greedy algorithm can be used to solve
A) Fractional knapsack Problem B) Integer knapsack Problem
C) Any knapsack problem D) Only for finding spanning tree

8 Fuzzy systems are examples of knowledge based systems which are
A) Structured and Numeric B) Structured and Symbolic
C) Unstructured and Numeric D) Unstructured and Symbolic

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9 A distributed system is a collection of
A) Loosely coupled hardware on tightly coupled software
B) Tightly coupled hardware on loosely coupled software
C) Tightly coupled software on loosely coupled hardware
D) Loosely coupled software on tightly coupled hardware

10 A grammar is meaningless
A) If terminal set and non terminal set are not disjoint
B) If left hand side of a production is a single terminal
C) If left hand side of a production has no non terminal
D) All of these

11 Algorithms of Data mining can be applied
A) Only to small database B) Only to large database
C) Any type of database D) None of these

12 Twiddle factor is given by
A) $W = e^{-j(2\pi/N)}$ B) $W = e^{j(2\pi/N)}$ C) $W = ej(2/N)$ D) None of these

13 Which of the following is NOT an inference rule used in predicate calculus
A) Replacement B) Substitution C) Simplification D) Abduction

14 Which of the following is true about temporal database
A) It satisfies First Normal form B) It does not satisfy First Normal form
C) It stores only images D) Cannot say

15 Home location and visitor location registers are used in
A) Networking and switching subsystem B) Radio subsystem
C) Cooperation and maintenance centre D) Authentication centre

16 ID3 algorithm in data mining uses
A) Entropy B) Gini index C) Gini ratio D) None of these

17 Which of the following statements is FALSE?
A) An unambiguous grammar has same leftmost and rightmost derivation
B) An $LL_{(1)}$ parser is a top-down parser
C) LALR is more powerful than SLR
D) An ambiguous grammar can never be $LR_{(k)}$ for any k

18 Consider the rule
BIG_SALARY(Y) :– Y>60000, EMPLOYEE(X), Salary(X, Y)
where X is the name of the employee getting salary Y. This deductive rule is a
A) Safe rule B) Not Safe rule C) May be safe rule D) Cannot say

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19 Process that expands the range of intensity levels in an image is called
A) Linear stretching B) Contrast stretching C) Color stretching D) Elastic stretching

20 Communication is achieved in distributed systems by
A) Disk Sharing B) Shared memory location C) File sharing D) Message passing

21 The bandwidth of a critically sampled signal must be reduced by _____ filtering before its sampling rate is reduced by a down-sampler.
A) Low pass B) High pass C) Both A) and B) D) None of these

22 Priority Queue is implemented mostly using
A) A queue B) A linked list C) An array organized as heap D) A tree

23 Which of the following suffices to convert an arbitrary CFG to an LL(1) grammar?
A) Removing left recursion alone B) Factoring the grammar alone
C) Removing left recursion and factoring the grammar D) None of this

24 The off-springs produced in genetic algorithm are
A) Always fitter than their parents B) Sometimes fitter than their parents
C) Either of these D) None of these

25 In distributed systems, a logical clock is associated with
A) Each instruction B) Each process C) Each register D) None of these

26 Which of the following regular expression identity is true?
A) $r(*) = r^*$
B) $(r^*s^*)^* = (r + s)^*$
C) $(r + s)^* = r^* + s^*$
D) $r^*s^* = r^* + s^*$

27 In object oriented database system, data objects can be as a
A) Primary key B) Object identifier C) Foreign key D) None of these

28 Half duplex channel in GSM is a
A) Traffic channel B) Control channel C) Dedicated channel D)Broadcast channel

29 In which type of embedded system architecture a series of tasks are defined and each task gets its own environment to run
A) Simple Control Loop B) Interrupt controlled systems
C) Multi threading D) Cooperative multitasking

30 The FFT algorithms
A) Eliminate redundant calculation and enable to analyze spectral properties of signal.
B) Enable redundant calculation and enable to analyze spectral properties of signal.
C) Either A) or B)
D) None of these

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31 The probability of collision in hashing N items occurs when
A) N exceeds the memory of computer B) N exceeds 25
C) N exceeds the data segment D) N exceeds the code segment

32 Top down parsers are predictive parsers , because
A) Next tokens are predicted
B) Length of the parse tree is predicted before hand
C) Lowest node in the parse tree is predicted
D) Next lower level of the parse tree is predicted

33 Decision tree algorithm is used in
A) Classification B) Cluster analysis C) Either A) or B) D) Both A) and B)

34 From the sampling theorem it is known that the sampling rate of a critically sampled discrete-time signal with a spectrum occupying the full Nyquist range cannot be reduced any further since such a reduction will introduce _____
A) Aliasing B) Quantization C) Error D) None of above

35 The function 'double' multiplies every element of the input set by two. Then, the function 'double' has a least fixed point. The statement is
A) True B) False C) May be true D) Cannot say

36 Which of the following is true about a Genetic Algorithm (GA)
A) Always converges and guarantees optimal solution
B) Always converges and does not guarantee optimal solution
C) Sometimes converges and guarantees optimal solution
D) None of these

37 A network capable of connecting many subscribers through switches in a cellular system is called as
A) Amplifier B) BTS C) AuC D) PSTN

38 Drawback of IIR filters is/are:
A) Phase distortion and ringing. B) Prevent phase distortion
C) More computation D) All of the above

39 We have a grammar with not epsilon and unit production [i.e. of type A->ε and A ->a] to parse a string, with n tokens. What is the maximum number of reduce moves that can be taken by a bottom-up parser for this grammar?
A) 2n – 1 B) 2n C) n-1 D) n/2

40 Which of the following problems should, ideally, be not solved by recursion
A) Towers of Hanoi B) Preorder traversal of a tree
C) Fibonacci number generation D) Heap sort

SECTION – II

1 Consider the following rule:

ancestor(X,Y) ← parent(X,Y),
ancestor(X,Y)← parent(X,Z),ancestor(Z,Y).

with Herbrand base

parent={(bert,alice),(bert,george),(alice,derek),(alice,part),(derek,frank)}

How much iteration does Naïve fixpoint evaluation take and what are the new facts generated in each iteration? Explain.

2 Generate the intermediate code for the statement:
sum=A [i,j]+B[i,j].
Construct the DAG.

3 What do you mean by Digital Signature in distributed computing? Explain different methods for generating and verifying signatures.

4 Write a critical note on Dejong optimization techniques.

5 The time spent (in minutes) by a customer in a bus stop awaiting to board a bus is

1 .07, 7. 19, 6.62, 1 1.27, 7.28, 10.69, 1 6.25, 6.10, 3.00, 14.12,11.81
12.32, 20.21, 12.53, 7.59, 12.81, 6.72, 9.58, 8.01, 9.33, 13.75, 13.92
14.13, 14.46, 11.16, 10.38, 11.13, 3.56, 4.57, 17.85, 11.97, 16.96, 5.04
13.77, 6.60, 14.34, 11.70, 11.95, 9.24, 9.65, 13.88, 8.93, 12.72, 9.00
0.89, 13.39, 10.37, 20.53, 9.92, 3.49

Using appropriate methods, determine how the time is distributed.
(One may assume additional data, if required)

SECTION – III

1 Explain Lincoln Laboratory Fast Digital Processor (FDP) structure. How can this structure be made suitable for speech processing system? Explain.

2 State one real world problem, which can be solved using genetic algorithm but not using artificial neural network. Suggest encoding scheme, genetic operators, fitness function and other features of the genetic algorithm used. Explain why artificial neural network is not a feasible methodology for the problem stated.

3 Write the following information into contingency table. Define similarity coefficient by following formula and find the set of variables that are most similar.

$$\text{similarity coefficient} = \frac{a}{a+b+c}$$

Variables	Indication	Values for person				
		P1	P2	P3	P4	P5
Education	Illiterate (0) Literate (1)	1	1	1	1	1
Occupation	Agriculture(0) Others(1)	1	0	1	0	0
Marital status	Married(1) Unmarried(0)	1	1	1	1	1
Residential area	City (1) Rural(0)	0	1	0	1	0