EPI-Computer Science Sample Questions

1 The problems 3-SAT and 2-SAT are
A) both in P
B) both NP-complete
C) NP-complete and in P respectively
D) undecidable and NP-complete respectively
Answer : (C)

2 Consider the following relation schema pertaining to a student's database: Student (roll no, name, address) Enroll (roll no, course no, course name) where the primary keys are shown underlined. The number of tuples in the Student and Enroll tables are 120 and 8 respectively. What are the maximum and minimum number of tuples that can be present in (Student * Enroll),where '*'denotes natural join?
A) 8, 8
B) 120, 8
C) 960, 8
D) 960, 120
Answer : (C)

3 Consider a relation scheme R = (A, B, C, D, E, H) on which the following functional dependencies hold : (A -> B, BC -> D, E -> C, D -> A). What are the candidate keys of R?
A) AE, BE
B) AE, BE, DE
C) AEH, BEH, BCH
D) AEH, BEH, DEH
Answer : (D)

4 The goal of structured programming is to
A) have well indented programs
B) be able to infer the flow of control from the compiled code
C) be able to infer the flow of control from the program text
D) avoid the use of GOTO statements
Answer : (C)

5 The tightest lower bound on the number of comparisons, in the worst ease, for comparison-based sorting is of the order of
A) n
B) n 2
C) n log n
D) n log2 n
Answer : (B)

6 A circuit outputs a digit in the form of 4 bits. 0 is represented by 0000,1 by 0001,..., 9 by 1001. A combinational circuit is to be designed which takes these 4 bits as input and outputs 1 if the digit $\geq$ 5, and 0 otherwise. If only AND, OR and NOT gates may be used, what is the minimum number of gates required
A) 2
B) 3
C) 4

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D) 5

Answer: (C)

7 WA and B are the only two stations on an Ethernet. Each has a steady queue of frames to send. Both A and B attempt to transmit a frame, collide, and A wins the first backoff race. At the end of this successful transmission by A, both A and B attempt to transmit and collide. The probability that A wins the second backoff race is

A) 0.5

B) 0.625

C) 0.75

D) 1.0

Answer : (A)

8 If 73x (in base-x number system) is equal to 54y (in base-y number system),the possible values of x and y are

A) 8, 16

B) 10, 12

C) 9, 13

D) 8, 11

Answer : (D)

9 In a packet switching network, packets are routed from source to destination along a single path having two intermediate nodes. If the message size is 24 bytes and each packet contains a header of 3 bytes, then the optimum packet size is

A) 4

B) 6

C) 7

D) 9

Answer: (D)

10 A Priority-Queue is implemented as a Max-Heap. Initially, it has 5 elements. The level-order traversal of the heap is given below: 10, 8,5,3,2 Two new elements 1 and 7 are inserted in the heap in that order. The level-order traversal of the heap after the insertion of the elements is

A) 10,8,7,5,3,2,1

B) 10,8,7,2,3,1,5

C) 10,8,7,1,2,3,5

D) 10,8,7,3,2,1,5

Answer : (D)

11 Consider an operating system capable of loading and executing a single sequential user process at a time. The disk head scheduling algorithm used is First Come First Served (FCFS). If FCFS is replaced by Shortest Seek Time First (SSTF),claimed by the vendor to give 50% better benchmark results, what is the expected improvement in the I/O performance of user programs ?

A) 50%

B) 40%

C) 25%br> D) 0%

Answer : (D)

12 How many distinct binary search trees can be created out of 4 distinct keys?

A) 5

B) 14
C) 24
D) 42
Answer : (B)

Q-13 Select the one true statement. A) Every binary tree is either complete or full.
B) Every complete binary tree is also a full binary tree.
C) Every full binary tree is also a complete binary tree
D) No binary tree is both complete and full.

Q-14 Which data structure has the fastest insertion procedure? A) Binary search tree
B) Ordered array
C) Heap
D) Unordered linked list
E) Ordered linked list

Q-15 What are the complexities of the insert, remove and search methods of a binary search tree in the worst case? A) insert is $O(n)$,remove is $O(n)$,search is $O(n)$
B) insert is $O(\log n)$,remove is $O(\log n)$,search is $O(n)$
C) insert is $O(\log n)$,remove is $O(\log n)$,search is $O(\log n)$
D) insert is $O(\log n)$,remove is $O(\log n)$,search is $O(1)$
E) These methods can't be defined on a binary search tree

Q-16 This Ethernet frame type is characterized by its use of the code AA in the SAP fields. A) Ethernet II
B) Ethernet RAW
C) Ethernet 802.2
D) Ethernet SNAP

Q-17 Which of the following are examples of routed protocols? (Choose all that apply) A) IP
B) IPX
C) RIP
D) OSPF
E) AppleTalk

Q-18 If switches are used to replace hubs on a network, which of the following statements is true? A) The number of broadcast domains will decrease
B) The number of collision domains will increase
C) The number of collision domains will decrease
D) The number of broadcast domains will be zero

Q-19 Full duplex Ethernet communication is only possible when:

A. Systems are connected to same LAN segments
B. Systems are connected to a bridged ports
C. Systems are connected to their own switch port
D. Systems are running over a fibre optic connection
Q-20 SQL is the combination of
A) DDL and DQL

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B) DDL , DML and DQL

C) DDL,DML,DQL and DCL

D) None of these

Q-21 Which of the following applications may use a stack?

A) A parentheses balancing program.

B) Keeping track of local variables at run time.

C) Syntax analyser for a compiler.

D) All of the above

Q -22 Consider the implementation of the Stack using a partially-filled array. What goes wrong if we try to store the top of the Stack at location [0] and the bottom of the Stack at the last used position of the array?

A) Both peek and pop would require linear time.

B) Both push and pop would require linear time.

C) The Stack could not be used to check balanced parentheses.

D) The Stack could not be used to evaluate postfix expressions.

Q-23 Select the one true statement.

A) Every binary tree is either complete or full.

B) Every complete binary tree is also a full binary tree.

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Q-24 Which data structure has the fastest insertion procedure? A) Binary search tree

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C) insert is $O(\log n)$,remove is $O(\log n)$,search is $O(\log n)$

D) insert is $O(\log n)$,remove is $O(\log n)$,search is $O(1)$

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Q-29 Full duplex Ethernet communication is only possible when:

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B) DDL , DML and DQL

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D) None of these

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A) A parentheses balancing program.

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C) Syntax analyser for a compiler.

D) All of the above

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