1Answer (A)  
The box B1 gets exected when left subtree of n is NULL and right sbtree is not NULL. In this case, height of n will be height of right subtree plus one.  
The box B2 gets executed when both left and right sbtrees of n are not NULL. In this case, height of n will be max of heights of left and right sbtrees of n plus 1.

2Answer (a)  
Getid() and GetName() can be there in the base class as these functions have the same implementation for all subclasses. As the question says that every employee must have salary and salary is determined by their category, getSalary() must be there as an abstract function in base class. And all subclasses should implement salary according to their category.

3Answer (b)  
Abstraction, Encapsulation, Polymorphism and Inheritance are the essential features of a OOP Language (See the [Wiki page](http://en.wikipedia.org/wiki/Object-oriented_programming) for OOP).

4Answer: (B)  
Minimum spanning tree for 2 nodes would be

(v1) \_ (v2)

Total weight 3

Minimum spanning tree for 3 nodes would be

(v1) \_ (v2)

|

(v3)

Total weight= 3 + 4 = 7

Minimum spanning tree for 4 nodes would be

(v1) \_ (v2) \_ (v4)

|

(v3)

Total weight= 3 + 4 + 6 = 13

Minimum spanning tree for 5 nodes would be

(v1) \_ (v2) \_ (v4)

|

(v3)

|

(v5)

Total weight= 3 + 4 + 6 + 8 = 21

Minimum spanning tree for 6 nodes would be

(v1) \_ (v2) \_ (v4) \_ (v6)

|

(v3)

|

(v5)

Total weight= 3 + 4 + 6 + 8 + 10 = 31

We can observe from above examples that when we add kth node, the weight of spanning tree increases by 2k-2. Let T(n) be the weight of minimum spanning tree. T(n) can be written as

T(n) = T(n-1) + (2n-2) for n > 2  
T(1) = 0, T(2) = 0 and T(2) = 3

The recurrence can be written as sum of series (2n – 2) + (2n-4) + (2n-6) + (2n-8) + …. 3 and solution of this recurrence is n^2 – n + 1.

5Answer: (C)  
Any MST which has more than 5 nodes will have the same distance between v5 and v6 as the basic structure of all MSTs (with more than 5 nodes) would be following.

(v1) \_ (v2) \_ (v4) \_ (v6) \_ . . (more even numbered nodes)

|

(v3)

|

(v5)

|

.

.

(more odd numbered nodes)

Distance between v5 and v6 = 3 + 4 + 6 + 8 + 10 = 31

6.Answer: (B)  
Let us consider the given expression (7 ↓ 3 ↑ 4 ↑ 3 ↓ 2).

Since the precedence of ↑ is higher, the sub-expression ([3 ↑ 4 ↑ 3) will be evaluated first. In this sub-expression, 4 ↑ 3 would be evaluated first because ↑ is right to left associative. So the expression is evaluated as ((7 ↓ (3 ↑ (4 ↑ 3))) ↓ 2). Also, note that among the two ↓ operators, first one is evaluated before the second one because the associativity of ↓ is left to right.

7.Answer (a)

8.Answer (d)  
sum has no use in foo(), it is there just to confuse. Function foo() just prints all digits of a number. In main, there is one more printf statement after foo(), so one more 0 is printed after all digits of n.

9.Answer(d)  
Explanation:  
Recursive expression for the above program will be.

T(n) = 2T(n-1) + c

T(1) = c1.

Let us solve it.

T(n) = 2(2T(n-2) + c) + c = 4T(n-2) + 3c

T(n) = 8T(n-3) + 6c + c = 8T(n-3) + 7c

T(n) = 16T(n-4) + 14c + c = 16T(n-4) + 15c

............................................................

.............................................................

T(n) = (2^(n-1))T(1) + (2^(n-1) - 1)c

T(n) = O(2^n)

10. When inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return

b. FAEKCDHGB

11.D

12.D

13.D

14.A

15.B

16.Answer: A

17.Answer (C)  
Total 16 packets are sent. See following table for sequence of events. Since [go-back-n](http://en.wikipedia.org/wiki/Go-Back-N_ARQ) error control strategy is used, all packets after a lost packet are sent again.

Sender Receiver

1

2 1

3 2

4 3

5 4

6

7 6

7

[Timeout for 5]

5

6 5

7 6

8

9

8

9

[Timeout for 7]

7

8 7

9 8

[Timeout for 9]

9

9

18.Answer (B)  
[SMTP](http://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol)is an application layer protocol used for e-mail transmission.  
[TCP](http://en.wikipedia.org/wiki/Transmission_Control_Protocol)is a core transport layer protocol.  
[BGP](http://en.wikipedia.org/wiki/Border_Gateway_Protocol)is a network layer protocol backing the core routing decisions on the Internet  
[PPP](http://en.wikipedia.org/wiki/Point-to-point_protocol)is a data link layer protocol commonly used in establishing a direct connection between two networking nodes.