This quiz has 4 questions, for a total of 30 points.

1. **10 points** Draw the result of deleting the node with key 5 from the following Binary Search Tree.

   ![Binary Search Tree Diagram]

   **Solution:** 6 points for moving the successor or predecessor to the deleted node’s position. 4 points for a resulting tree that is a BST and includes all the nodes except the deleted one.

   ![Solution Diagram]

2. **7 points** What is the output, if any, of the following Python program?

   ```python
   def h(b):
       return 42
   
   class C:
       def m(self, b):
           return self.h(b)
       def __init__(self, j):
           self.w = j
       def h(self, x):
           return x.w - self.w
   
   a = C(1)
   b = C(2)
   print(a.m(b))
   ```

   **Solution:** 7 points for the correct output, which is

   ```python
   1
   ```
3. **6 points** Suppose we create an algorithm that detects whether two length \( n \) words are anagrams by counting the occurrences of each letter (English alphabet) in the first word and similarly for the second word, and then checking whether the number of occurrences of each letter are the same for the two words. Which of the following expresses an upper bound on the time complexity of this algorithm?

a) \( O(n \lg n) \)

b) \( \Theta(\lg n) \)

c) \( \Omega(n) \)

d) \( O(\lg n) \)

**Solution:** a) \( O(n \lg n) \) is the correct answer. \( (O(n)) \) would be an even better answer but that wasn’t an option.) The answers b) and d) are incorrect because they are too low. The answer c) is incorrect because it expresses a lower bound.

4. **7 points** Write down the sequence of keys from the following Binary Search Tree, ordering according to the post-order traversal strategy.

```
   20
  /  \
3   45
/   /  \
2  8   22  46
```

**Solution:** 7 points for the correct sequence, which is:

\[2, 8, 3, 22, 46, 45, 20\]

(4 points if the sequence is close, such as missing one number.)