Your Name:_____ .
Your Entry Number: _____. Your lab TA name:_____.

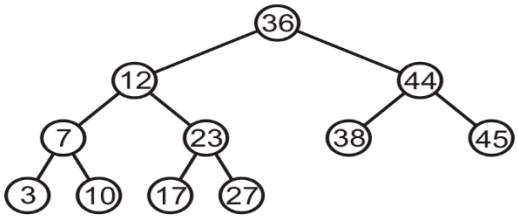
# COL106, Quiz 1

Q1 **[8 marks]**. For the following pairs of functions, mark all the correct statements (using a tick mark or T/True in the corresponding column) regarding their asymptotic behaviour.

(a) $f1(n) = 20\, n \log(n)\,; g1(n) = \; n \log(n) \frac{e^n}{1+e^n}$
(b) $f2(n) = 10 + 20\, n^2 + 30\, n^3; g2(n) = \; n^3$
(c) $f3(n) = n^3 \sqrt{\log(n)}\;\; g3(n) = n^3 \log\,(n)$
(d) $f4(n) = \; e^{2n}; g4(n) = e^n$

| **Statement [Mark correct statements]** | **f1(n), g1(n)** | **f2(n), g2(n)** | **f3(n), g3(n)** | **f4(n), g4(n)** |
|---|---|---|---|---|
| f(n)=big-O(g(n)) | | | | |
| g(n) = big-O(f(n)) | | | | |
| f(n) = Θ(g(n)) | | | | |
| f(n) = small-o(g(n)) | | | | |
| g(n) = small-o(f(n)) | | | | |
| f(n) = big-Ω(g(n)) | | | | |
| g(n) = big- Ω(f(n)) | | | | |

Q2. **[7 marks]** Write down in-order, pre-order, post-order and breath-first traversal of the following tree and answer the other questions.




(a) Is this tree a binary search tree (Y/N):_____.
(b) Is this tree a height balanced tree (Y/N):_____.
(c) What is the height of this tree:_____.
(d) In-order traversal: _____.
(e) Pre-order traversal: _____.
(f) Post-order traversal: _____.
(g) Breath-first traversal: _____.

Q3. **[5 marks]** What will be the output of the following C program?

```c
#include <stdio.h>

int main() {
    int x, y, z;
    char xc, yc, zc;

    x = 0xF0; xc = x;
    printf("x is: %d\n", x);
    y = 0x8D; yc = y;
    printf("y is: %d\n", y);
    printf("yc is: %d\n", yc);
    z = x & y;
    printf("x & y is: %d\n", z);
    z = x | y;
    printf("x | y is: %d\n", z);
    z = (x >> 2);
    printf("x >> 2 is: %x\n", z);
    zc = (xc >> 2);
    printf("xc >> 2 is: %x\n", zc);
    z = (y << 1);
    printf("y << 1 is: %o\n", z);
    z = (yc << 1);
    printf("yc << 1 is: %o\n", z);
    z = (x >> 2) | (y << 1);
    printf("(x >> 2) | (y << 1) is: %d\n", z);
}
```

(a) Line 1:: _____.
(b) Line 2:_____.
(c) Line 3:_____.
(d) Line 4:_____.
(e) Line 5:_____.
(f) Line 6:_____.
(g) Line 7:_____.
(h) Line 8:_____.
(i) Line 9:_____.
(j) Line 10:_____.