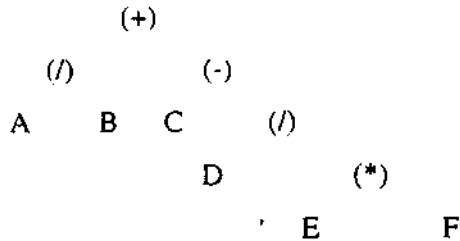


1. Compute the following X1 and X2 :
- (1)  $(101.0111)_2 = (X1)_{16}$  (4%)
  - (2)  $11.01_2 * 1.01_2 = (X2)_2$  (6%)

2. Print the (1) Preorder, (2) Inorder, and (3) Postorder traversals of the following Binary syntax tree: (12%)



3. The following C program is written based on "call by reference", try to rewrite it using "call by value": (10%)

```

void main()
{
    int x = 2, j = 15;
    swap(&x, &y);
    printf ("x = %d, y = %d", x, y);
}

swap(i, j)
int *i, *j;
{
    int *temp;
    *temp = *i;
    *i = *j;
    *j = *temp;
}
    
```

4. What kind of sorting method (heap sort, merge sort, shell sort, bubble sort, or quick sort) is employed in the following C program? Explain why. (10%)

```
sort(v, n)
int v[], n;
{
    int gap, i, j, temp;
    for (gap = n/2; gap > 0; gap /= 2)
        for (i = gap; i < n; i++)
            for (j = i - gap; j >= 0 && v[j] > v[j+gap]; j -= gap)
                {
                    temp = v[j];
                    v[j] = v[j+gap];
                    v[j+gap] = temp;
                }
}
```

5. Briefly explain the functions of “operation systems” and “compilers”. (10%)
6. Which data structure (Array, Linked List, Binary Tree, and Stack) is best for searching, insertion, and deletion? explain why. (8%)
7. Briefly describe the differences between the following pairs: (20%)
- (1) Compiler .vs. interpreter
  - (2) Object-oriented programming .vs. object-oriented modeling
  - (3) Data .vs. information
  - (4) Logical record .vs. physical record
  - (5) Client-Server architecture .vs. Three-tire architecture
8. Briefly explain the seven layers of the Open System Interconnection (OSI) reference model. (10%)
9. Briefly explain the three layers of a database system. (10%)