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Class-TE-COM .B

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ASSIGNMENT NO.1

CODE:

```
#include <bits/stdc++.h>
```

```
using namespace std;
```

```
struct Instr {int addr; string label, op, operand;};
```

```
map<string,int> SYMTAB; int LC=0;
```

```
vector<string> program={
```

```
    "START 100",
```

```
    "MVI A,5",
```

```
    "MVI B,3",
```

```
    "LOOP: ADD B",
```

```
    "STA RESULT",
```

```
    "SUB A",
```

```
    "JNZ LOOP",
```

```
    "HLT",
```

```
    "RESULT: DC 0",
```

```
    "END"
```

```
};
```

```
// ----- PASS 1 -----
```

```

vector<Instr> pass1(){
    vector<Instr> inter;
    for(string line:program){
        if(line.empty()) continue;
        string label="",op,operand="";
        size_t pos=line.find(':');
        if(pos!=string::npos){label=line.substr(0,pos); line=line.substr(pos+1);}
        stringstream ss(line); ss>>op>>ws; getline(ss,operand);
        if(op=="START"){LC=stoi(operand);}
        else if(op=="DC"){SYMTAB[label]=LC++; inter.push_back({LC-1,label,op,operand});}
        else if(op=="END") break;
        else {if(!label.empty()) SYMTAB[label]=LC; inter.push_back({LC,label,op,operand});
LC+=2;}
    }
    return inter;
}

```

// ----- PASS 2 -----

```

void pass2(vector<Instr>& inter){
    cout<<"SYMBOL TABLE:\n";
    for(auto&s:SYMTAB) cout<<s.first<<" = "<<s.second<<"\n";

    cout<<"\nMACHINE CODE:\n";
    for(auto&i:inter){
        int b1=0,b2=0;
        if(i.op=="MVI"){b1=0x20; b2=stoi(i.operand.substr(i.operand.find(',')+1));}
    }
}

```

```

        else if(i.op=="ADD") b1=0x30;
        else if(i.op=="SUB") b1=0x40;
        else if(i.op=="STA"){b1=0x51; b2=SYMTAB[i.operand];}
        else if(i.op=="JNZ"){b1=0x61; b2=SYMTAB[i.operand];}
        else if(i.op=="HLT") b1=0xFF;
        else if(i.op=="DC") b1=stoi(i.operand);
        cout<<setw(3)<<setfill('0')<<i.addr<<": "
             <<hex<<uppercase<<setw(2)<<setfill('0')<<b1<<" "
             <<setw(2)<<setfill('0')<<b2<<dec
             <<" ("<<i.op<<" "<<i.operand<<")\n";
    }
}

```

```

int main(){
    auto inter=pass1();
    pass2(inter);
}

```

OUTPUT:

SYMBOL TABLE:

LOOP = 104

RESULT = 116

MACHINE CODE:

100: 20 05 (MVI A,5)

102: 20 03 (MVI B,3)

104: 30 00 (ADD B)

106: 51 116 (STA RESULT)

108: 40 00 (SUB A)

110: 61 104 (JNZ LOOP)

112: FF 00 (HLT)

116: 00 00 (DC 0)