Ex No: 10 **Date:**

IMPLEMENT CODE OPTIMIZATION TECHNIQUES DEAD CODE AND COMMON SUB EXPRESSION ELIMINATION

AIM:

To write a C program to implement the dead code elimination and common sub expression elimination (code optimization) techniques.

ALGORITHM:

- Start
- Create the input file which contains three address code.
- Open the file in read mode.
- If the file pointer returns NULL, exit the program else go to 5.
- Scan the input symbol from left to right.
- Store the first expression in a string.
- Compare the string with the other expressions in the file.
- If there is a match, remove the expression from the input file.
- Perform these steps 5-8 for all the input symbols in the file.
- Scan the input symbol from the file from left to right.
- Get the operand before the operator from the three address code.
- Check whether the operand is used in any other expression in the three address codes.
- If the operand is not used, then eliminate the complete expression from the three-address code else go to 14.
- Perform steps 11 to 13 for all the operands in the three address code till the end of the file is reached. • Stop.

PROGRAM:

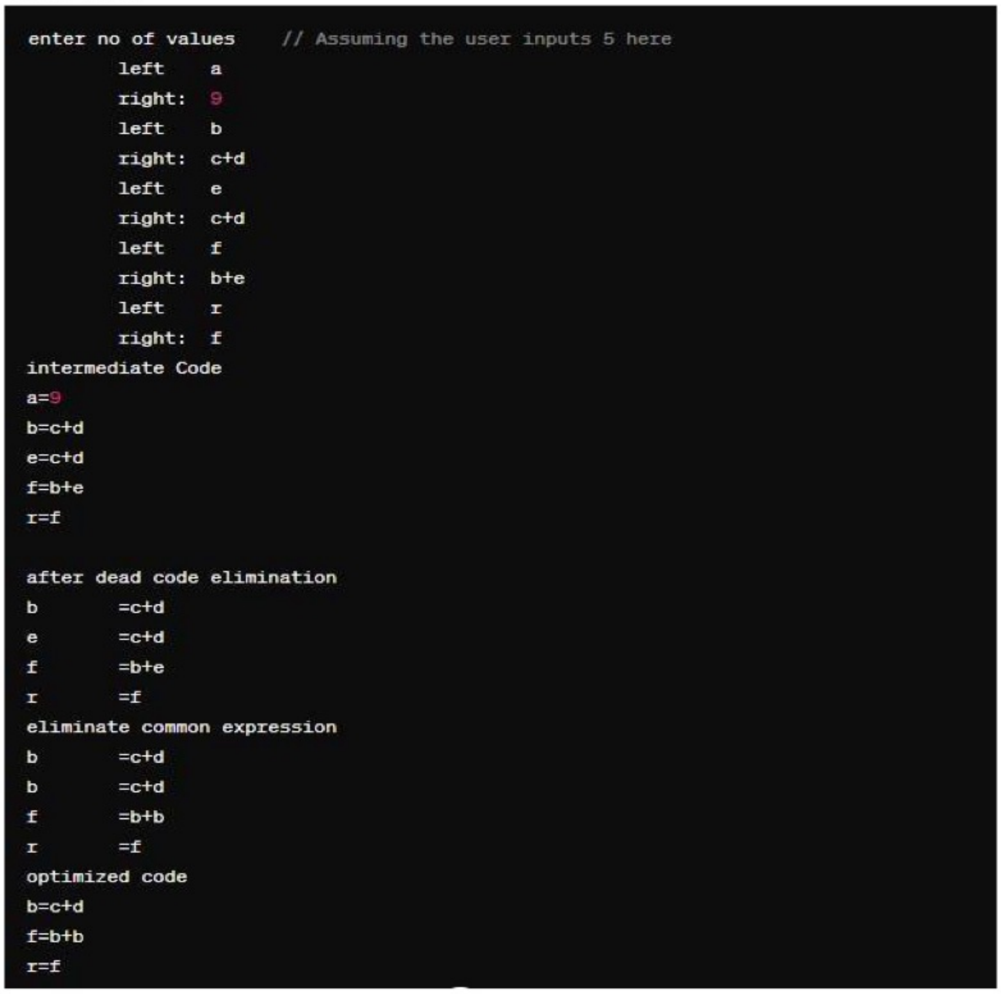
```
#include<stdio.h>

#include<string.h>
```

```
struct op {
char l;     char
r[20]; } op[10],
pr[10];

void main() {
   int a, i, k, j, n, z = 0, m, q;
   char *p, *l;
char temp, t;
   char *tem;

   printf("enter no of
values");     scanf("%d", &n);
for (i = 0; i < n; i++) {
printf("\tleft\t");          op[i].l =
getchar();
printf("\tright:\t");
scanf("%s", op[i].r);
   }

   printf("intermediate Code\n");
for (i = 0; i < n; i++) {
printf("%c=", op[i].l);
printf("%s\n", op[i].r);
   }

   for (i = 0; i < n - 1; i++) {
temp = op[i].l;          for (j = 0; j
< n; j++) {              p =
strchr(op[j].r, temp);              if
(p) {                  pr[z].l = op[i].l;
strcpy(pr[z].r, op[i].r);
z++;
         }
      }     }     pr[z].l = op[n -
1].l;     strcpy(pr[z].r, op[n -
1].r);     z++;
```

```
   printf("\nafter dead code elimination\n");
for (k = 0; k < z; k++) {
printf("%c\t=", pr[k].l);        printf("%s\n",
pr[k].r);
   }
   //sub expression elimination
   for (m = 0; m < z; m++) {
      tem = pr[m].r;        for (j =
m + 1; j < z; j++) {            p =
strstr(tem, pr[j].r);            if (p) {
t = pr[j].l;                pr[j].l =
pr[m].l;                for (i = 0; i < z;
i++) {                    l =
strchr(pr[i].r, t);                    if (l)
{                        a = l - pr[i].r;
pr[i].r[a] = pr[m].l;
                    }
                }
            }
        }
}

   printf("eliminate common expression\n");
for (i = 0; i < z; i++) {        printf("%c\t=",
pr[i].l);        printf("%s\n", pr[i].r);
   }
   // duplicate production elimination
for (i = 0; i < z; i++) {        for (j = i
+ 1; j < z; j++) {            q =
strcmp(pr[i].r, pr[j].r);            if
((pr[i].l == pr[j].l) && !q) {
pr[i].l = '\0';                strcpy(pr[i].r,
'\0');
            }
        }
}
```

```
   printf("optimized code");
for (i = 0; i < z; i++) {         if
(pr[i].l != '\0') {
printf("%c=", pr[i].l);
printf("%s\n", pr[i].r);
       }
   }
   getchar();
}
```

OUTPUT:



```
enter no of values    // Assuming the user inputs 5 here
        left    a
        right:  9
        left    b
        right:  c+d
        left    e
        right:  c+d
        left    f
        right:  b+e
        left    r
        right:  f
intermediate Code
a=9
b=c+d
e=c+d
f=b+e
r=f

after dead code elimination
b       =c+d
e       =c+d
f       =b+e
r       =f
eliminate common expression
b       =c+d
b       =c+d
f       =b+b
r       =f
optimized code
b=c+d
f=b+b
r=f
```

RESULT: