# Assignment 4

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## 1 Boolean Expressions

(A) $= \overline{W}\ \overline{X}\ \overline{Y}\ \overline{Z} + \overline{W}\ \overline{X}\ \overline{Y}\ \overline{Z} + \overline{W}\ \overline{X}\ \mathrm{Y}\ \overline{Z} + \overline{W}\ \mathrm{X}\ \mathrm{Y}\ \overline{Z} + \overline{W}\ \overline{X}\ \overline{Y}\ \mathrm{Z}$

(B) $= \overline{Z}\ \overline{Y}\ \overline{X}\ \mathrm{W} + \overline{Z}\ \overline{Y}\ \mathrm{X}\ \overline{W} + \overline{Z}\ \mathrm{Y}\ \overline{X}\ \mathrm{W} + \overline{Z}\ \mathrm{Y}\ \mathrm{X}\ \overline{W}$

(C) $= \overline{Z}\ \overline{Y}\ \mathrm{X}\ \mathrm{W} + \overline{Z}\ \mathrm{Y}\ \overline{X}\ \overline{W} + \overline{Z}\ \mathrm{Y}\ \overline{X}\ \mathrm{W} + \overline{Z}\ \mathrm{Y}\ \mathrm{X}\ \overline{W}$

(D) $= \mathrm{W}\ \mathrm{X}\ \mathrm{Y}\ \overline{Z} + \overline{W}\ \overline{X}\ \overline{Y}\ \mathrm{Z}$

## 2 C code

```c
// by bailapudivijay

//This program implements the incremental decoder using boolean
    logic in C

#include <stdio.h>

//The  main function
int main(void)
{

//unsigned char takes input as 1 byte

unsigned char  Z=0x01,Y=0x00,X=0x00,W=0x01;//inputs in hex
unsigned char one = 0x01;//used for displaying the output in bit
unsigned char A,B,C,D;//outputs

D = (W&X&Y&(~Z))|((~W)&(~X)&(~Y)&Z);//Boolean function for D
B=((~Z)&(~Y)&(~X)&W)|((~Z)&(~Y)&X&(~W))|((~Z)&Y&(~X)&W)|((~Z)&Y&X
    &(~W));
C=((~Z)&(~Y)&X&W)|((~Z)&Y&(~X)&(~W))|((~Z)&Y&(~Z)&W)|((~Z)&Y&X&(~W)
    );
A = ((~W)&(~X)&(~Y)&(~Z))|((~W)&(X)&(~Y)&(~Z))|((~W)&(~X)&Y&(~Z))
    |((~W)&X&Y&(~Z))|((~W)&(~X)&(~Y)&(Z));
//Boolean function for A

printf("%x%x%x%x",one&Z,one&Y,one&X,one&W);//Iutput ZYXW
printf(" ");
```

```
25 printf("%x%x%x%x\n"  ,one&D,one&C,one&B,one&A); //Output DCBA
26 return 0;
27 }
```