OCN

EXPT – 02

```
clc
clear all
close all

n1=input('Enter n1 : ');
n2=input('Enter n2 : ');
cd=input('Enter core diameter : ');
cr=cd/2;
cr=cr/(1000000);
w=input('Enter wavelength : ');
w=w/(1000000000);
NA=power((n1)^(2)-(n2)^(2),0.5);
acc=asin(NA);
acc=(acc)*((180)/(3.14));
cri=asin(n2/n1);
cri=(cri)*((180)/(3.14));
V=((2*3.14)/w)*(cr)*(NA);
M=((V)^2)/(2);
disp('NA = ')
disp(NA)
disp('Acceptance angle = ');
disp(acc);
disp('Critical angle = ')
disp(cri)
disp('Normalized frequency = ');
disp(V)
disp('Number of modes = ')
disp(M);
```

Output :

```
Enter n1: 1.47
Enter n2: 1.46
Enter core diameter: 50
Enter wavelength: 1550
NA = 0.1712
Acceptance angle = 9.8610
Critical angle = 83.3553
Normalized frequency = 17.3381
Number of modes = 150.3050
```

EXPT – 03

```
clc;
clear all;
close all;
pi=3.14;
n=1.46;
l=[0.63 1 1.3].*10^-6;
p=0.286;
b=7.*(10.^-11);
k=1.381.*(10.^-23);
t=1400;
y=(8.*((pi).^3).*((n).^8).*((p).^2).*b.*k.*t)./(3.*((l).^4))
l1=850:100:1550;
y1=(8.*((pi).^3).*((n).^8).*((p).^2).*b.*k.*t)./(3.*((l1).^4))
plot(l1,y1);
xlabel('lambda')
ylabel('loss in optical fiber')
alpha=exp(-(y.*1000));
disp('alpha=');
disp(alpha)
a=1./alpha;
alphadb=-10.*log10(alpha);
disp('alphadb=');
disp(alphadb)
```

EXPT – 04

```
clc
clear all
close all

lambda=0.85;
c=3*(10)^8;
M1=((0.025)/(lambda*c))*(10)^12;
disp('M in ps (nm*km)^(-1)');
disp(M1);

sigma_m=(20/(c*lambda))*(0.025)*(10)^9;
disp('Sigma_m in ns km^(-1)');
disp(sigma_m);
sigma_m1=(0.0012/c)*(0.025)*(10)^12;
disp('Sigma_m1 in ns km^(-1)');
disp(sigma_m1);

lambda_1=0.85:0.1:1.5;
M1=((0.025)./(lambda_1*c))*(10)^12;
```

```
figure
plot(lambda_1,M1)
xlabel('Wavelength')
ylabel('Material Dispersion')
```

EXPT – 05

Part A:

```
clc; clear; close all;

S0=0.0970;
lambda_o=1310;
n2=1.48;
der=0.26;
rri=0.002;
lambda=1250:1:1600;
c=3*(10^5);

Dwg=(((-1)*n2*rri*der)./(c.*lambda))*(10^(12));
Dt=(lambda.*S0.*(1-((lambda_o./lambda).^4)))/4;

Dm=Dt-Dwg;
figure;
xlabel('Wavelength (nm)');
ylabel('Dispersion (ps/(nm*km))');
title('Dispersion profile');
plot(lambda,Dm);
hold all;
plot(lambda,Dwg);
hold all;
plot(lambda,Dt);
grid on;
legend('Material','Waveguide','Total');
```

Part B:

```
clc; clear; close all;

S0=0.070;
lambda_o=1550;
n2=1.48;
der=0.26;
rri=0.002;
lambda=1250:1:1600;
c=3*(10^5);
```

```
Dwg=(((-1)*n2*rri*der)./(c.*lambda))*(10^(12));
Dt=(lambda.*S0.*(1-((lambda_o./lambda).^4)))/4;

Dm=Dt-Dwg;
figure;
xlabel('Wavelength (nm)');
ylabel('Dispersion (ps/(nm*km))');
title('Dispersion profile');
plot(lambda,Dt);
grid on;
legend('Total Dispersion');
```

EXPT – 06

```
clc; clear all; close all;

t=-5:0.0005:5;
z=0:pi/8:pi/2;
for k=1:length(t)
   for m=1:length(z)
      u(k,m)=sech(t(k))*exp(1i*z(m)/2);     %% 1i - one I

v(k,m)=4*(cosh(3*t(k))+3*exp(4*1i*z(m))*cosh(t(k)))*exp(1i*z(m)/2)/(cosh(4*t(k))+4*cosh(2*t(k))+3*co
s(4*z(m)));
   end
end

u=abs(u);
v=abs(v);
figure
ribbon(t,u,0.01)
xlabel('Time')
ylabel('Amplitude')
zlabel('Intensity')
figure
ribbon(t,v,0.01)
xlabel('Time')
ylabel('Amplitude')
zlabel('Intensity')
```

EXPT – 07

Question 1

```
% RX sensitivity=-42 db/m TX power=50um
%Ploss=2*lc+alpha*L+SM(6db); lc(end connector loss = 1 db)
%attenuation constant of fiber(alpha)=3.5 db/km
Pt=ceil(20*log(0.5))
Pr=(-42)
Pl=(Pt-Pr)
lc= 1;
Sm=6;
alphaf=3.5;
L=(Pl-2*lc-Sm)/alphaf
L=[0 1 2 3 4 5 6]
for i=1:length(L)
    p_level(i)=-14-(3.5*L(i));
end
plot(L,p_level)
grid on
title('Power Level V/s Distance');
xlabel('Distance');
ylabel('Power Level');
```

Question 2

```
clc;
clear all;
close all;
pr=-32;
pt=3;
sm=6;
alpha=0.3;
c_loss=2;
j_loss=2;
L=60;
f_loss=L*alpha;
pl=pt-pr;
totalp_loss=f_loss+(2*(j_loss+c_loss)+sm+c_loss)

x=0:1:L;
for i=0:L
  y(i+1)=2-0.3*i;
end
plot(x,y)
grid on
title('Attenuation v/s Length')
xlabel('Length')
ylabel('Attenuation')
```

Expt – 08

```
clc
clear all
close all
lam_p= 980;
lam_p1=1480;
lam_s=1500;
lam_s1=1510;
ps_in=0.190;
Pp_in=0:200;
ps_out=ps_in+((lam_p/lam_s)*Pp_in);
ps_out1=ps_in+((lam_p1/lam_s1)*Pp_in);

plot(Pp_in,ps_out,Pp_in,ps_out1)
grid on
title('Ps out V/s Pp in')
xlabel('Ps out')
ylabel('Pp in')
```