Experiment No:-02

Aim:-To study V-Number and no. of modes supported by Fiber

Q.1)

```
clc;clear,close;
lambda=input("enter first wavelength in nm:");
lambda=lambda*1e-9;
lambda1=input("enter second wavelength in nm:");
lambda1=lambda1*1e-9;
lambda2a=input("enter third wavelength in nm:");
lambda2a=lambda2a*1e-9;
a=input("enter core radius in um:");
a=a*1e-6;
n1=input("enter RI of core:");
n2=input("enter RI of cladding:");
NA=sqrt(n1^2-n2^2);
disp("Numerical aperature:",NA);
v=(2*%pi/lambda)*a*NA;
disp("Normalized freqency at 850nm:",v);
v1=(2*%pi/lambda1)*a*NA;
disp("Normalized frequency at 1300nm:",v1);
Ms1=v1^2/2;
disp("no.of modes at 1300nm",Ms1);
v2=(2*%pi/lambda2a)*a*NA;
disp("Normalized frequency at 1550nm",v2);
Ms2=v2^2/2;
disp("no.of modes at 1550nm",Ms2);
```

Output:-

enter first wavelength in nm:850

enter second wavelength in nm:1300

enter third wavelength in nm:1550

enter core radius in um:25

enter RI of core:1.48

enter RI of cladding:1.46

"Numerical aperature:"

0.2424871

"Normalized freqency at 850nm:"

44.811514

"Normalized frequency at 1300nm:"

29.299836

"no.of modes at 1300nm"

429.24019

"Normalized frequency at 1550nm"

24.574056

"no.of modes at 1550nm"

301.94211

Q.2)

```
clc;clear;close;
delta=input("enter RRID:");
n1=input("enter RI of core:");
lambda=input("enter wavelength in um:");
Ms=input("no. of modes in step index fiber:");
lambda=lambda*1e-6;
v=sqrt(Ms*2);
disp("v number:",v);
NA=n1*sqrt(2*delta);
```

```
disp("Numerical aperature:",NA);
a=(v*lambda)/(2*%pi*NA);
disp("core radius in um:",a*1e6);
d=2*a;
disp("core diameter in um",d*1e6);
amax=(2.405*lambda)/(2*%pi*NA);
disp("Max core radius for single mode in um:",amax*1e6);
dmax=2*amax;
disp("max core diameter for single mode in um:",dmax*1e6);
```

Output:-

```
enter RRID:0.01
enter RI of core:1.5
enter wavelength in um:1.3
no. of modes in step index fiber:1100
 "v number:"
  46.904158
 "Numerical aperature:"
  0.2121320
 "core radius in um:"
  45.747627
 "core diameter in um"
  91.495253
 "Max core radius for single mode in um:"
  2.3456991
 "max core diameter for single mode in um:"
  4.6913983
```

Q.3)

```
clc;clear;close;
Mg=input("no.of modes in Graded index fiber:");
NA=input("Numerical aperature:");
d=input("Enter core diameter in um:");
a=d/2;
alpha=2;
v=sqrt(2*(Mg*(alpha+2)/alpha));
disp("V-Number:",v);
alpha=(2*%pi*a*NA)/v;
disp("wavelength of profile parameter:",alpha);
```

Output:-

```
no.of modes in Graded index fiber:742
Numerical aperature:0.3
Enter core diameter in um:70
  "V-Number:"
   54.479354
  "wavelength of profile parameter:"
   1.2109807
```