Experiment-01:
Experiment Name: Write a program to determine the free space path loss and the power received
using python

```
import math
f = float(input('Enter the frequency in MHz: '))
l= 300/f
print('Thus the wavelength, L : ',l)
d = float(input('Enter the distance in Km: '))
gt = float(input('Enter the transmitting antenna gain in dB:'))
gr = float(input('Enter the receiving antenna gain in dB:'))
pt = float(input('Enter the transmitted power in dB: '))
l1 = 20*math.log(d,10)
l2 = 20*math.log(f,10)
ls = 32.44 + l1 + l2
print('The path loss is:','{:.2f}'.format(ls),'dB')
pr = pt + gt + gr - ls
print('The received power is:','{:.2f}'.format(pr),'dB')
pp = pr/10
prw = math.pow(10,pp)
print('The received power is: ',prw ,'watts')
```

output:

Enter the frequency in MHz: 800

Thus the wavelength, L : 0.375

Enter the distance in Km: 200

Enter the transmitting antenna gain in dB:5

Enter the receiving antenna gain in dB:6

Enter the transmitted power in dB: 50

The path loss is: 136.52 dB

The received power is: -75.52 dB

The received power is: 2.803883950278753e-08 watts

Experiment-02:
Experiment Name: Write a program to calculate the Link budget for satellite communication using python.

```
import math
pt = float(input('Enter the iput power in watts:'))
Pt = 10*math.log(pt, 10) #calculation transmitted power in db
Gt = float(input('Enter the transmitting antenna gain in db'))
Gr = float(input('Enter the recieving antenna gain in db'))
EIRP = Pt + Gt #calculating Eirp
d = float(input('Enter the distance in Km:'))
f = float(input('Enter the frecquency im MHz:'))
fsl = 32.4 + 20*math.log(d, 10) + 20*math.log(f,10) #calculating path loss
rfl = float(input('Enter the reciver feeder loss in db :'))
aa = float(input('Enter the atmospheric absrption in db :'))
aml = float(input('Enter the antenna misalignment loss in db :'))
pl = float(input('Enter the polarization loss in db :'))
losses = fsl + rfl + aa + aml +pl
print('Total loss='+ str(losses) + 'Db.')
P = EIRP + Gr -losses
print('Total losses power ='+str(P)+ 'db')
```

output:

Enter the iput power in watts:50

Enter the transmitting antenna gain in db40

Enter the recieving antenna gain in db1

Enter the distance in Km:100

Enter the frecquency im MHz:9000000

Enter the reciver feeder loss in db :10

Enter the atmospheric absrption in db :10

Enter the antenna misalignment loss in db :5

Enter the polarization loss in db :1

Total loss=237.48485018878648Db.

Total losses power =-179.4951501454263db

Experiment-03:
Experiment Name: Write a program to calculate the link budget for satellite communication and also calculate the carrier to noise ratio for uplink and downlink and also the overall carrier to noise ratio using python.

```
EIRPu = float(input('Enter the uplink EIRP: '))
EIRPd = float(input('Enter the downlink EIRP: '))
GTRu = float(input('Enter the uplink G/T: '))
GTRd = float(input('Enter the downlink G/T: '))
FSLu = float(input('Enter the uplink FSL: '))
FSLd = float(input('Enter the downlink FSL: '))
RFLu = float(input('Enter the uplink RFL: '))
RFLd = float(input('Enter the downlink RFL: '))
AAu = float(input('Enter the uplink AA: '))
AAd = float(input('Enter the downlink AA: '))
AMLu = float(input('Enter the uplink AML: '))
AMLd = float(input('Enter the downlink AML: '))
lossu = FSLu + RFLu + AAu + AMLu
print('uplink loss: ',lossu)
lossd = FSLd + RFLd + AAd + AMLd
print('downlink loss: ',lossd)
CNRu = EIRPu + GTRu - lossu + 228.6
print('Total carrier to noise ratio for uplink is:
','{:.2f}'.format(CNRu),'decilog')
CNRd = EIRPd + GTRd - lossd + 228.6
print('Total carrier to noise ratio for downlink is:
','{:.2f}'.format(CNRd),'decilog')
CNRt = (CNRu * CNRd)/(CNRu + CNRd)
print('Total carrier to noise ratio is: ','{:.2f}'.format(CNRt),'decilog')
```

Output:

Enter the uplink EIRP: 50

Enter the downlink EIRP: 45

Enter the uplink G/T: 50

Enter the downlink G/T: 40

Enter the uplink FSL: 5

Enter the downlink FSL: 5

Enter the uplink RFL: 20

Enter the downlink RFL: 20

Enter the uplink AA: 10

Enter the downlink AA: 10

Enter the uplink AML: 10

Enter the downlink AML: 10

uplink loss: 45.0

downlink loss: 45.0

Total carrier to noise ratio for uplink is: 283.60 decilog

Total carrier to noise ratio for downlink is: 268.60 decilog

Total carrier to noise ratio is: 137.95 decilog

Experiment no: 04.
Experiment Name: Write a program to calculate the numerical aperture of a fiber optic core using python.

```
from __future__ import division
import math
#initialisation of variables
ncore=float(input('Enter the ncore:')) #refractive index of core
nclad=float(input('Enter the nclad:')) #refractive index of cladding
NA=math.sqrt(ncore**2-nclad**2) #numerical aperture
#RESULTS
print("The numerical aperture =",round(NA,5))
```

output:

Enter the ncore:1.55

Enter the nclad:1.51

The numerical aperture = 0.34986