APPENDIX

Matlab Code:

```
clc;close all;clear all;
k=1;
for n=1:2
    for i=1:3
M=2^i;
b=(sin(pi/M))*(sin(pi/M));
r=1;
alph=2^(3*r)-1;
a=(M-1)*pi/M;
pdb=0:20;
p=10.^(pdb/10);
%****************** relay*****************
A=1/pi*(quadv(@(x) ((sin(x).^(2*n+2))),1e-100,(M-1)*pi/M));
ps=p/(n+1);
pr=ps;
lamdas=1./ps;
lamdaf=(1./ps)+(1./pr);
lamddf=1./pr;
lamdqf = 1./(( ps) + ( pr));
% PAF(k,:)=(lamdas.*(lamdaf.^n))*A./b^(n+1); %SER
approximation
% PDF(k,:)=A*lamdas.*lamddf.^n;
% PQF(k,:)= A.* lamdas.*(lamdqf.^n);
%***************************************
C_DF = b./lamddf
C_AF = b./lamdaf
C_SD = b./lamdas
C_QF = b./lamdqf
PAF(k,:) = 1/pi*(quadv(@(x)
((sin(x).^2)./((sin(x).^2)+C_SD)),1e-10,(M-1)*pi/M)).*...
    (quadv(@(x) ((sin(x).^2)./((sin(x).^2)+C_AF)).^n,1e-
10,(M-1)*pi/M))
PDF(k,:)= 1/pi*(quadv(@(x)
((sin(x).^2)./((sin(x).^2)+C_SD)),1e-10,(M-1)*pi/M)).*...
    (quadv(@(x) ((sin(x).^2)./((sin(x).^2)+C_DF)).^n,1e-
10,(M-1)*pi/M))
PQF(k,:)= 1/pi*(quadv(@(x)
((sin(x).^2)./((sin(x).^2)+C_SD)),1e-10,(M-1)*pi/M)).*...
    (quadv(@(x) ((sin(x).^2)./((sin(x).^2)+C_QF)).^n,1e-
10,(M-1)*pi/M))
k=k+1;
    end
end
```

```
for k=1:6
    figure
semilogy(pdb,PAF(k,:),pdb,PDF(k,:),pdb,PQF(k,:), ...
'linewidth',2);
grid
legend('AF ','DF ','QF ')
xlabel('P/No (dB)')
ylabel('SER')
if k==1
title('Single Relay With BPSK Modulation')
elseif k==2
title('Single Relay With QPSK Modulation')
elseif k==3
title('Single Relay With 8PSK Modulation')
elseif k==4
title('Two Relay With BPSK Modulation')
elseif k==5
title('Two Relay With QPSK Modulation')
else
title('Two Relay With 8PSK Modulation')
end
end

for i=1:3
figure
semilogy(pdb,PAF([i i+3],:),pdb,PDF([i i+3],:),pdb,PQF ([i
i+3],:),'linewidth',2);grid
legend('AF One Relay','AF Two Relay','DF One Relay','DF Two
Relay','QF One Relay','QF Two Relay')
xlabel('P/No (dB)')
ylabel('SER')
if i==1
title('BPSK Modulation')
elseif i==2
title('QPSK Modulation')
else
title('8PSK Modulation')
end
end

for i=1:6
if i==1
disp('|================    Single Relay With BPSK
Modulation   ================|')
elseif i==2
```

```
disp('|================    Single Relay With QPSK
Modulation    ===============|')
elseif i==3
disp('|================    Single Relay With 8PSK
Modulation   ================|')
elseif i==4
disp('|================    Two Relay With BPSK Modulation
==================|')
elseif i==5
disp('|================    Two Relay With QPSK Modulation
==================|')
else
disp('|================    Two Relay With 8PSK Modulation
==================|')
end
disp('|=================================================
====================|')
disp('|P/No (dB) |        AF          |         DF        |
QF         |')
disp('|-------------------------------------------------
--------------------|')

for h=1:5:21
    if PAF(i,h)>10000
        fprintf('|    %0.0f     | %0.11f  | %0.15f | %0.15f
|\n',pdb(h),PAF(i,h),PDF(i,h),PQF(i,h))
    elseif PAF(i,h)>100
        fprintf('|    %0.0f     | %0.13f  | %0.15f | %0.15f
|\n',pdb(h),PAF(i,h),PDF(i,h),PQF(i,h))
    elseif PAF(i,h)>10& pdb(h)>=10
         fprintf('|    %0.0f    | %0.14f  | %0.15f | %0.15f
|\n',pdb(h),PAF(i,h),PDF(i,h),PQF(i,h))
    elseif PAF(i,h)>10
         fprintf('|    %0.0f     | %0.14f  | %0.15f |
%0.15f  |\n',pdb(h),PAF(i,h),PDF(i,h),PQF(i,h))
    elseif pdb(h)<10
    fprintf('|    %0.0f     | %0.15f  | %0.15f | %0.15f
|\n',pdb(h),PAF(i,h),PDF(i,h),PQF(i,h))

    else
         fprintf('|    %0.0f    | %0.15f  | %0.15f | %0.15f
|\n',pdb(h),PAF(i,h),PDF(i,h),PQF(i,h))
    end
end

disp('|=================================================
====================|')
```

```
 fprintf('\n\n\n')
end
```