**KDOMS ASSIGNMENT-6**

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**ME17B114**

**Mathematica Code:**

rp=3.5;

e=1.2;

rr=1;

θ=(θr\*180)/π;

y1=(1.6/3600)\*(θ^2);

y2=(((-1)/3375)\*(θ^2))+((4/45)\*θ)-(8/3);

y3=4;

y4=(((-1)/3375)\*((330-θ)^2))+((4/45)\*(330-θ))-(8/3);

y5=(1.6/3600)\*((330-θ)^2);

y6=0;

y11=D[y1,θr];

y21=D[y2,θr];

y31=D[y3,θr];

y41=D[y4,θr];

y51=D[y5,θr];

y61=D[y6,θr];

ϕ1=ArcTan[(y11-e)/(y1+(((rp^2)-(e^2))^0.5))];

ϕ2=ArcTan[(y21-e)/(y2+(((rp^2)-(e^2))^0.5))];

ϕ3=ArcTan[(y31-e)/(y3+(((rp^2)-(e^2))^0.5))];

ϕ4=ArcTan[(y41-e)/(y4+(((rp^2)-(e^2))^0.5))];

ϕ5=ArcTan[(y51-e)/(y5+(((rp^2)-(e^2))^0.5))];

ϕ6=ArcTan[(y61-e)/(y6+(((rp^2)-(e^2))^0.5))];

rc1=((((((rp^2)-(e^2))^0.5)+y1-(rr\*Cos[ϕ1]))^2)+((e+(rr\*Sin[ϕ1]))^2))^0.5;

rc2=((((((rp^2)-(e^2))^0.5)+y2-(rr\*Cos[ϕ2]))^2)+((e+(rr\*Sin[ϕ2]))^2))^0.5;

rc3=((((((rp^2)-(e^2))^0.5)+y3-(rr\*Cos[ϕ3]))^2)+((e+(rr\*Sin[ϕ3]))^2))^0.5;

rc4=((((((rp^2)-(e^2))^0.5)+y4-(rr\*Cos[ϕ4]))^2)+((e+(rr\*Sin[ϕ4]))^2))^0.5;

rc5=((((((rp^2)-(e^2))^0.5)+y5-(rr\*Cos[ϕ5]))^2)+((e+(rr\*Sin[ϕ5]))^2))^0.5;

rc6=((((((rp^2)-(e^2))^0.5)+y6-(rr\*Cos[ϕ6]))^2)+((e+(rr\*Sin[ϕ6]))^2))^0.5;

rc=Piecewise[{{rc1,0<=θr<=(π/3)},{rc2,(π/3)<θr<=((5\*π)/6)},{rc3,((5\*π)/6)<θr<=π},{rc4,π<θr<=((3\*π)/2)},{rc5,((3\*π)/2)<θr<=((2\*π)-(π/6))},{rc6,((2\*π)-(π/6))<θr<(2\*π)}}];

y=Piecewise[{{y1,0<=θr<=(π/3)},{y2,(π/3)<θr<=((5\*π)/6)},{y3,((5\*π)/6)<θr<=π},{y4,π<θr<=((3\*π)/2)},{y5,((3\*π)/2)<θr<=((2\*π)-(π/6))},{y6,((2\*π)-(π/6))<θr<(2\*π)}}];

ϕ=Piecewise[{{ϕ1,0<=θr<=(π/3)},{ϕ2,(π/3)<θr<=((5\*π)/6)},{ϕ3,((5\*π)/6)<θr<=π},{ϕ4,π<θr<=((3\*π)/2)},{ϕ5,((3\*π)/2)<θr<=((2\*π)-(π/6))},{ϕ6,((2\*π)-(π/6))<θr<(2\*π)}}];

PolarPlot[rc,{θr,0,(2\*π)}]

Plot[y,{θr,0,(2\*π)}]

Plot[((ϕ\*180)/π),{θr,0,(2\*π)}]

**Displacement Curve:**



**Pressure Angle Curve:**



**Cam Profile:**

