```
format compact;
syms Ay1 By1

% Assembly 1 (Stat. Indet.)
% English Units (lb, in, ...)

x1 = 5;
x2 = 3;
x3 = 3;

Fo = 19.497; % Generated Force by Offset Mass (lb)
E = 30e6; % Elastic Modulus of (1020) Steel
d = 0.5; % Shaft Diamater
I = (pi.*d.^4)./(64); % Moment of Inertia (Circular Rod/Shaft)
L = x1 + x2 + x3; % Rod/Shaft Length

% Equation 1
domx1 = ((Fo.*(x1.^2))/(6.*E.*I)).*(3.*L - x1); % Deflection at x1 due
 to Offset Mass Force (in)
dAx1 = (((x1.^2))/(6.*E.*I)).*(3.*x1 - x1); % Deflection at x1 due to
 Bearing Vertical Reaction at A (in)
dBx1 = (((x1.^2))/(6.*E.*I)).*(3.*(x1+x2) - x1); % Deflection at x1
 due to Bearing Vertical Reaction at B (in)

% Equation 2
domx1x2 = (((Fo.*(x1+x2).^2))/(6.*E.*I)).*(3.*L - (x1+x2)); %
 Deflection at x1+x2 due to Offset Mass Force (in)
dAx1x2 = (((x1.^2))/(6.*E.*I)).*(3.*(x1+x2) - x1); % Deflection at
 x1+x2 due to Bearing Vertical Reaction at A (in)
dBx1x2 = ((((x1+x2).^2))/(6.*E.*I)).*(3.*(x1+x2) - (x1+x2)); %
 Deflection at x1+x2 due to Bearing Vertical Reaction at B (in)

eqn1 = dAx1*Ay1 + dBx1*By1 == domx1;
eqn2 = dAx1x2*Ay1 + dBx1x2*By1 == domx1x2;

[sys,dom] = equationsToMatrix([eqn1, eqn2], [Ay1, By1]);
Sol = linsolve(sys,dom);

Ay = vpa(Sol(1),6) %  Reaction Ay (@ Bearing A) (lb)
By = vpa(Sol(2),6) %  Reaction By (@ Bearing B) (lb)

Fmy1 = Fo - Sol(1) - Sol(2); % Sol(1) = Ay, Sol(2) = By
Fmy = vpa(Fmy1,6) % Vertical Reaction at Motor/Shaft Interface (lb)

Mm1 = Fo.*(x1+x2+x3) - Sol(2).*(x1+x2) - Sol(1).*(x1); % Sol(1) = Ay,
 Sol(2) = By
Mm = vpa(Mm1,6) % Reaction Moment at Motor/Shaft Interface (lb*in)

Ay =
-27.7291
By =
43.3267
```

```
Fmy =
3.8994
Mm =
6.499
```

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```
format compact;
syms Ay2 By2

% Assembly 2 (Stat. Indet.)
% English Units (lb, in, ...)

x1 = 5;
x2 = 3;
x3 = 3;

Fo = 19.497; % Generated Force by Offset Mass (lb)
E = 30e6; % Elastic Modulus of (1020) Steel
d = 0.5; % Shaft Diamater
I = (pi.*d.^4)./(64); % Moment of Inertia (Circular Rod/Shaft)
% L = x1 + x2 + x3; % Rod/Shaft Length

% Equation 1
domx1 = ((Fo.*(x1.^2))/(6.*E.*I)).*(3.*(x1+x2) - x1); % Deflection at
 x1 due to Offset Mass Force (in)
dAx1 = (((x1.^2))/(6.*E.*I)).*(3.*x1 - x1); % Deflection at x1 due to
 Bearing Vertical Reaction at A (in)
dBx1 = (((x1.^2))/(6.*E.*I)).*(3.*(x1+x2+x3) - x1); % Deflection at x1
 due to Bearing Vertical Reaction at B (in)

% Equation 2
domx1x2x3 = (((Fo.*(x1+x2).^2))/(6.*E.*I)).*(3.*(x1+x2+x3) -
 (x1+x2)); % Deflection at x1+x2 due to Offset Mass Force (in)
dAx1x2x3 = (((x1.^2))/(6.*E.*I)).*(3.*(x1+x2+x3) - x1); % Deflection
 at x1+x2 due to Bearing Vertical Reaction at A (in)
dBx1x2x3 = ((((x1+x2+x3).^2))/(6.*E.*I)).*(3.*(x1+x2+x3) -
 (x1+x2+x3)); % Deflection at x1+x2 due to Bearing Vertical Reaction
 at B (in)

eqn1 = dAx1*Ay2 + dBx1*By2 == domx1;
eqn2 = dAx1x2x3*Ay2 + dBx1x2x3*By2 == domx1x2x3;

[sys,dom] = equationsToMatrix([eqn1, eqn2], [Ay2, By2]);
Sol = linsolve(sys,dom);

Ay = vpa(Sol(1),6) %  Reaction Ay (@ Bearing A) (lb)
By = vpa(Sol(2),6) %  Reaction By (@ Bearing B) (lb)

Fmy2 = Fo - Sol(1) - Sol(2); % Sol(1) = Ay, Sol(2) = By
Fmy = vpa(Fmy2,6) % Vertical Reaction at Motor/Shaft Interface (lb)

Mm2 = Fo.*(x1+x2) - Sol(2).*(x1+x2+x3) - Sol(1).*(x1); % Sol(1) = Ay,
 Sol(2) = By
Mm = vpa(Mm2,6) % Reaction Moment at Motor/Shaft Interface (lb*in)

Ay =
16.0475
By =
```

```
7.49885
Fmy =
-4.04938
Mm =
-6.74896
```

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