Program for design of shaft, Problem Number 4.

Problem Statement:A shaft is mounted between bearings located 9.5 m apart and transmits 10, 000 kW at 90 rpm. The shaft weighs 66,000 N has outside diameter 450 mm and inner diameter 300 mm. Determine the stresses induced in the shaft and the angular deflection between the bearings. Do not neglect the weight the shaft. Take G = 80 kN/mm2 .

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Date : 14/09/2020

```
clc;
clear all;
```

Given Data:

L = 9.5 m = 9,500 mm

P = 10, 000 kN

n = 90 rpm

W = 66, 000 N

d0 = 450 mm

di= 300 mm

```
L = 9500
```

```
L = 9500
```

```
P = 1*10^4
```

```
P = 10000
```

```
n = 90
```

```
n = 90
```

```
W = 66000
```

```
W = 66000
```

```
do = 450
```

```
do = 450
```

```
di = 300
```

```
di = 300
```

Finding the k value

```
k = di/do
```

```
k = 0.6667
```

Finding the value of torque.

```
T = Eqn_3_3_a(P,n)
```

```
T = 1.0611e+09
```

Consider the weight of the shaft, it is like UDL For simply supported beam with UDL, we have :

```
M_max = (W*L)/8
```

```
M_max = 78375000
```

Finding the max stress and max shear using the theories.

```
[S_n, S_s] = Eqn_3_5_h(do,M_max,T,k)
```

```
S_n = 79.5634
S_s = 74.1048
```