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**MTH622 Assignment 2 Sol Spr 2021**

**Question No. 1**

**If the average distance between earth’s center and the moon’s center is 𝟑.𝟖𝟒×𝟏𝟎8 𝒎. Suppose 𝟓.𝟗𝟖 × 𝟏𝟎24 𝒌𝒈 & 𝟔.𝟑𝟕 × 𝟏𝟎6 𝒎 and 𝟕.𝟑𝟒×𝟏𝟎 22 𝒌𝒈 & 𝟏.𝟕𝟒×𝟏𝟎 6 𝒎 being mass and mean radius of earth and moon, respectively. Then**

**(i) Find the position of center of mass of the earth - moon system.**

**(ii) Center of mass lies within earth or not?**

**Solution Part (i)**

Mass of earth = Me = 5.98 ×1024 kg

Radius of earth = Re = 6.37 ×106 m

Mass of moon = Mm = 7.34 ×1022kg

Radius of moon = Rm = 1.74×106 m

Position to the center of mass = C =?

Formula of Position of Centre of mass is given as

C=MeRe+MmRm / Me + Mm

C = (5.98 ×1024)( 6.37 ×106)+( 7.34 ×1022)( 1.74×106)/ 5.98 ×1024 + 7.34 ×1022

C = 3.8220316× 1031 / 6.0534× 1024

C = 6313859.319

C = 6.313859 × 106 m

**Solution Part (ii)**

Me = 5.98 ×1024 kg

C = 6.313859 × 106

Since 5.98 ×1024 > 6.313859 × 106

Hence center of mass lies within earth.

**Question No 2.**

**A disc having radius equals to 50 cm and 3 kg mass. Calculate the moment of inertia about following two axes:**

**i. axis passing through the center and perpendicular to the plane of the disc**

**ii. axis touching the edge and perpendicular to the plane of the disc.**

**Solution Part (i)**

Rd = 50 cm = 0.5m

Md = 3 kg

Moment of inertia = I=?

As we know that moment of inertia of a disc having axis passing through the center and perpendicular to the plane of the disc is given as,

I = ½ MR2

I = 1/2(3)(0.5)2

I = ½(3)(0.25)

I = 0.75/2

I = 0.375 kgm2

**Solution Part (ii)**

As we know that moment of inertia of a disc having axis touching the edge and perpendicular to the plane of the disc is given as,

I = ½ MR2 + MR2

I = 0.375 + (3)(0.5)2

I = 0.375 + (3)(0.25)

I = 0.375 + 0.75

I = 1.12 5kgm2