Code.No: RR10302   RR   SET-1

I B.TECH – EXAMINATIONS, DECEMBER - 2010
ENGINEERING MECHANICS
(COMMON TO ME, MCT, MMT, MEP, AE, AME)
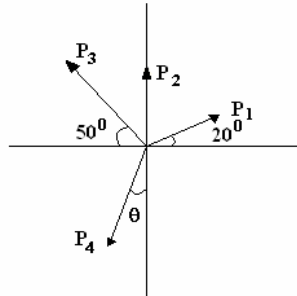
**Time: 3hours**   **Max.Marks:80**

Answer any FIVE questions
**All questions carry equal marks**
- - -

1.a)   Knowing that the particle A shown in figure is in equilibrium under the action of
       forces $P_1 = 350$ N, P_2, $P_3 = 225$N and $P_4 = 375$N. Find the magnitudes of P_2 and
   direction θ of P_4.

   b)   Two smooth cylinders of 3 m diameter and 100 N weight are separated by a chord
        of 4m long. They support another smooth cylinder of diameter 3m and 200N
        weight as shown in figure. Find the tension in the chord.   [8+8]
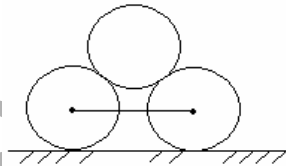
2.a)   A slender homogeneous wire of uniform cross section is bent into an arc of a
       circle with central angle θ and radius r. Determine the position of the centroid of
       the wire.
   b)   Find the moment of Inertia of plane area shown in figure about its vertical
        centroidal axes.   [8+8]
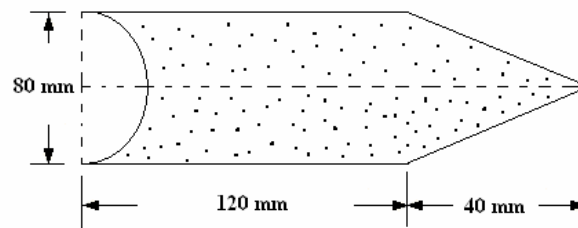
3.a)   Show that the moment of inertia of a thin circular ring of mass "M" and mean
       radius with respect to its geometric axis is MR^2.
   b)   Find the moment of inertia about the horizontal centroidal axis of shaded portion
        as shown in figure.   [16]
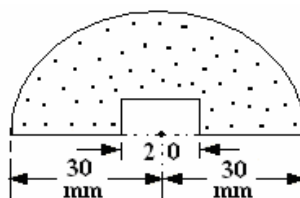
Code.No: RR10302

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SET-1

4. A square thread screw of a hand press has a mean diameter of 40 mm and pitch 5 mm. The diameter of the wheel turning the screw is 1.2 m. If a horizontal effort of 200N is applied to the wheel, find the force exerted by the press on a cotton bale being compressed. Coefficient of friction is 0.1. Is the press self locking. [16]

5. A shaft rotating at 200 rpm and transmits 6 Kw through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5m in diameter. Calculate the stress in the belt if it is an open belt. Take $\mu = 0.3$. [16]

6. A car enters a curved portion of the road of radius 200 m traveling at a constant speed of 20 m/s. Determine the components of velocity and acceleration of the car in the x and y direction 10 seconds after it has entered the curved portion of the road. [16]

7. A 2000 Kg Automobile is driven down a 5^0 incline at a speed of 90 km/h. When the brakes are applied causing a constant total braking force of 7.5 KN. Determine the distance traveled by Automobile as it comes to stop. Use work-energy method. [16]

8. A shaft of length 0.75m, supported freely at the ends, is carrying a body of mass 90 Kg at 0.25m from one end. Find the natural frequency of transverse vibration. Assume $E = 200GN/m^2$ and shaft diameter = 50 mm. [16]

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Code.No: RR10302　　　RR　　　SET-2

I B.TECH – EXAMINATIONS, DECEMBER - 2010
ENGINEERING MECHANICS
(COMMON TO ME, MCT, MMT, MEP, AE, AME)
Time: 3hours　　　　　　　　　　　　　　　　　　　　　**Max.Marks:80**
Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Show that the moment of inertia of a thin circular ring of mass "M" and mean radius with respect to its geometric axis is MR^2.

   b) Find the moment of inertia about the horizontal centroidal axis of shaded portion as shown in figure.　　　　　　　　　　　　　　　　　　　　[16]
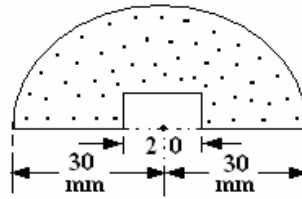

2. A square thread screw of a hand press has a mean diameter of 40 mm and pitch 5 mm. The diameter of the wheel turning the screw is 1.2 m. If a horizontal effort of 200N is applied to the wheel, find the force exerted by the press on a cotton bale being compressed. Coefficient of friction is 0.1. Is the press self locking. [16]

3. A shaft rotating at 200 rpm and transmits 6 Kw through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5m in diameter. Calculate the stress in the belt if it is an open belt. Take $\mu = 0.3$.　　　　　　　　　　　　　　　　　　　　　　　　　　　　[16]

4. A car enters a curved portion of the road of radius 200 m traveling at a constant speed of 20 m/s. Determine the components of velocity and acceleration of the car in the x and y direction 10 seconds after it has entered the curved portion of the road.　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[16]

5. A 2000 Kg Automobile is driven down a 5^0 incline at a speed of 90 km/h. When the brakes are applied causing a constant total braking force of 7.5 KN. Determine the distance traveled by Automobile as it comes to stop. Use work-energy method.　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[16]

6. A shaft of length 0.75m, supported freely at the ends, is carrying a body of mass 90 Kg at 0.25m from one end. Find the natural frequency of transverse vibration. Assume $E = 200 GN/m^2$ and shaft diameter = 50 mm.　　　　　　　　[16]
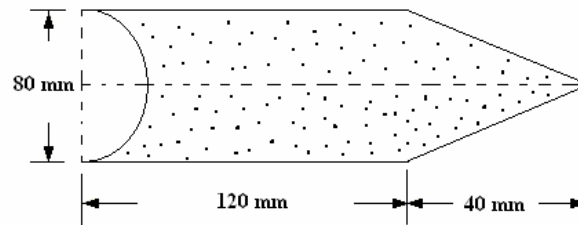
Code.No: RR10302   RR   SET-2

7.a) Knowing that the particle A shown in figure is in equilibrium under the action of forces $P_1 = 350$ N, P_2, $P_3 = 225$N and $P_4 = 375$N. Find the magnitudes of P_2 and direction θ of P_4.
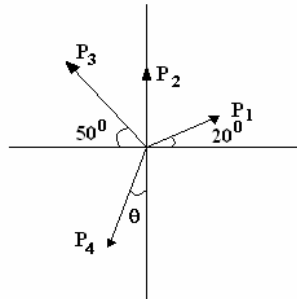
b) Two smooth cylinders of 3 m diameter and 100 N weight are separated by a chord of 4m long. They support another smooth cylinder of diameter 3m and 200N weight as shown in figure. Find the tension in the chord.   [8+8]
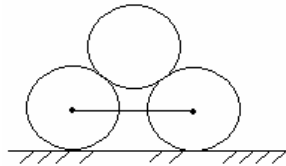
8.a) A slender homogeneous wire of uniform cross section is bent into an arc of a circle with central angle θ and radius r. Determine the position of the centroid of the wire.

b) Find the moment of Inertia of plane area shown in figure about its vertical centroidal axes.   [8+8]

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Code.No: RR10302   RR   SET-3

I B.TECH – EXAMINATIONS, DECEMBER - 2010
ENGINEERING MECHANICS
(COMMON TO ME, MCT, MMT, MEP, AE, AME)
**Time: 3hours**   **Max.Marks:80**
Answer any FIVE questions
All questions carry equal marks
- - -

1. A shaft rotating at 200 rpm and transmits 6 Kw through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5m in diameter. Calculate the stress in the belt if it is an open belt. Take $\mu = 0.3$.   [16]

2. A car enters a curved portion of the road of radius 200 m traveling at a constant speed of 20 m/s. Determine the components of velocity and acceleration of the car in the x and y direction 10 seconds after it has entered the curved portion of the road.   [16]

3. A 2000 Kg Automobile is driven down a 5^0 incline at a speed of 90 km/h. When the brakes are applied causing a constant total braking force of 7.5 KN. Determine the distance traveled by Automobile as it comes to stop. Use work-energy method.   [16]

4. A shaft of length 0.75m, supported freely at the ends, is carrying a body of mass 90 Kg at 0.25m from one end. Find the natural frequency of transverse vibration. Assume $E = 200GN / m^2$ and shaft diameter = 50 mm.   [16]

5.a) Knowing that the particle A shown in figure is in equilibrium under the action of forces P_1 = 350 N, P_2, P_3 = 225N and P_4 = 375N. Find the magnitudes of P_2 and direction θ of P_4.
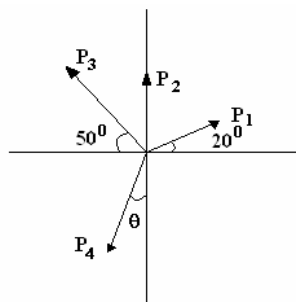
  b) Two smooth cylinders of 3 m diameter and 100 N weight are separated by a chord of 4m long. They support another smooth cylinder of diameter 3m and 200N weight as shown in figure. Find the tension in the chord.   [8+8]
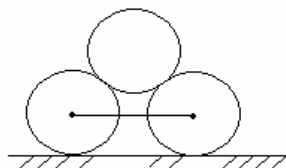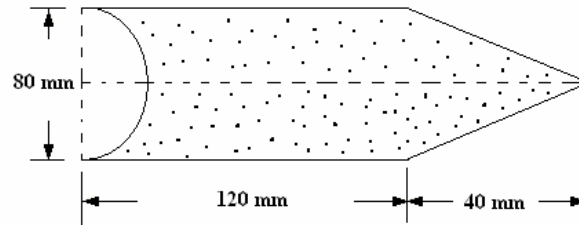
Code.No: RR10302   RR   SET-3

6.a) A slender homogeneous wire of uniform cross section is bent into an arc of a circle with central angle θ and radius r. Determine the position of the centroid of the wire.

  b) Find the moment of Inertia of plane area shown in figure about its vertical centroidal axes. [8+8]

7.a) Show that the moment of inertia of a thin circular ring of mass "M" and mean radius with respect to its geometric axis is MR^2.

  b) Find the moment of inertia about the horizontal centroidal axis of shaded portion as shown in figure. [16]
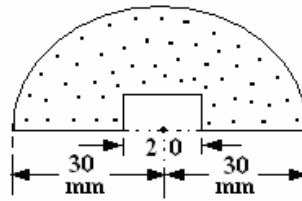
8. A square thread screw of a hand press has a mean diameter of 40 mm and pitch 5 mm. The diameter of the wheel turning the screw is 1.2 m. If a horizontal effort of 200N is applied to the wheel, find the force exerted by the press on a cotton bale being compressed. Coefficient of friction is 0.1. Is the press self locking. [16]

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Code.No: RR10302　　　RR　　　SET-4

I B.TECH – EXAMINATIONS, DECEMBER - 2010
**ENGINEERING MECHANICS**
(COMMON TO ME, MCT, MMT, MEP, AE, AME)
**Time: 3hours**　　　　　　　　　　　　　　　　　　**Max.Marks:80**
**Answer any FIVE questions**
All questions carry equal marks
- - -

1.　A 2000 Kg Automobile is driven down a 5^0 incline at a speed of 90 km/h. When the brakes are applied causing a constant total braking force of 7.5 KN. Determine the distance traveled by Automobile as it comes to stop. Use work-energy method.　　　　　　　　　　　　　　　　　　　　　　　　　[16]

2.　A shaft of length 0.75m, supported freely at the ends, is carrying a body of mass 90 Kg at 0.25m from one end. Find the natural frequency of transverse vibration. Assume $E = 200 GN/m^2$ and shaft diameter = 50 mm.　　　　　　[16]

3.a)　Knowing that the particle A shown in figure is in equilibrium under the action of forces $P_1 = 350$ N, P_2, $P_3 = 225N$ and $P_4 = 375N$. Find the magnitudes of P_2 and direction θ of P_4.
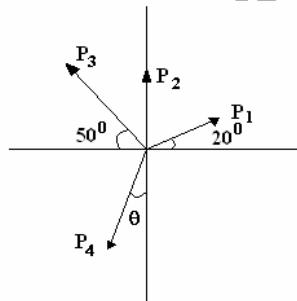

  b)　Two smooth cylinders of 3 m diameter and 100 N weight are separated by a chord of 4m long. They support another smooth cylinder of diameter 3m and 200N weight as shown in figure. Find the tension in the chord.　　　　　　[8+8]
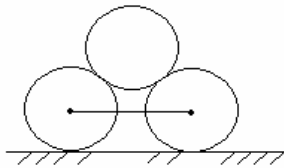
4.a)　A slender homogeneous wire of uniform cross section is bent into an arc of a circle with central angle θ and radius r. Determine the position of the centroid of the wire.
  b)　Find the moment of Inertia of plane area shown in figure about its vertical centroidal axes.　　　　　　　　　　　　　　　　　　　　　　[8+8]

Code.No: RR10302 | RR | SET-4
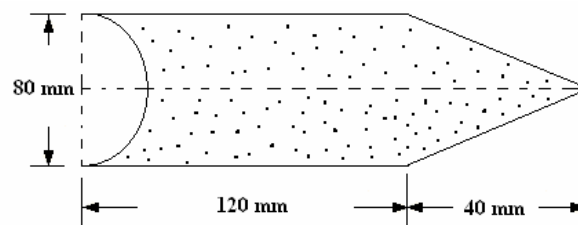
5.a) Show that the moment of inertia of a thin circular ring of mass "M" and mean radius with respect to its geometric axis is MR^2.

  b) Find the moment of inertia about the horizontal centroidal axis of shaded portion as shown in figure. [16]
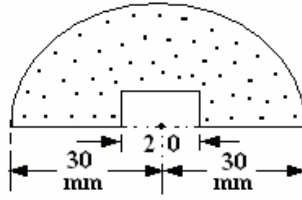
6. A square thread screw of a hand press has a mean diameter of 40 mm and pitch 5 mm. The diameter of the wheel turning the screw is 1.2 m. If a horizontal effort of 200N is applied to the wheel, find the force exerted by the press on a cotton bale being compressed. Coefficient of friction is 0.1. Is the press self locking. [16]

7. A shaft rotating at 200 rpm and transmits 6 Kw through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5m in diameter. Calculate the stress in the belt if it is an open belt. Take $\mu = 0.3$. [16]

8. A car enters a curved portion of the road of radius 200 m traveling at a constant speed of 20 m/s. Determine the components of velocity and acceleration of the car in the x and y direction 10 seconds after it has entered the curved portion of the road. [16]

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