Code No: R05210804 **R05** **Set No. 2**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

ENGINEERING MECHANICS

Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) The distance covered by a freely falling body in the last one second of its motion and that covered in the last but one second are in the ratio 5:4. Calculate the height from which the body was dropped and the velocity with which it strikes the ground.

   (b) A stationary car attains a maximum permissible speed of 80 km/hour in a distance of 40metres. It continues at this speed for a distance of 200 metres and then a uniform retardation brings it to a stop in 10 seconds. How far does the car travel from the starting point and what is the total elapsed time? [8+8]

2. (a) A homogeneous solid cylinder of weight 100 N whose axis is horizontal rotates about its axis, in frictionless bearings under the action of the weight of a 10N block which is carried by a rope wrapped around the cylinder. What will be angular velocity of cylinder two seconds after the motion starts? Assume the diameter of cylinder as 100cm.

   (b) A block of mass 5Kg resting on a 30^0 inclined plane is released. The block after travelling a distance of 0.5m along the inclined plane hits a spring of stiffness 15N/cm. Find the maximum compression of spring. Assume coefficient of friction between the block and the inclined plane is 0.2. As shown in the Figure 2b. [8+8]

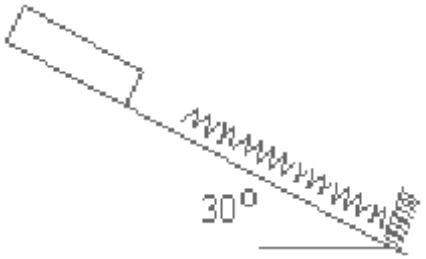

Figure 2b

3. The area shown in figure7 is revolved about x –axis to form a homogeneous solid of revolution of mass 'm'. Determine the mass moment of inertia of the solid about x-axis. [16]

Code No: R05210804 **R05** **Set No. 2**

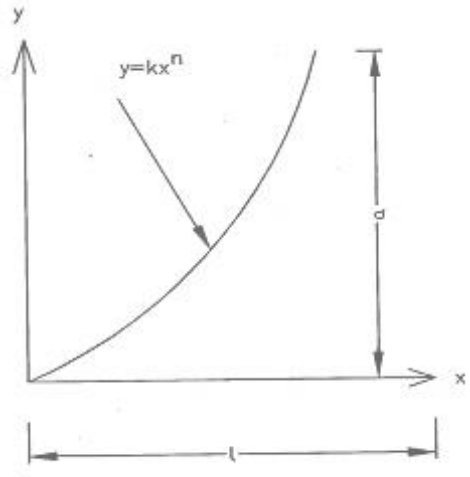

Figure 7

4. A leather belt is required to transmit 9kW from a pulley 1200 mm in diameter running at 200 r.p.m The angle embraced is 165^0 and the coefficient of friction between leather belt and pulley is 0.3. If the safe working stress for the leather belt is $1.4N/mm^2$ the weight of leather is $1000Kg/m^3$ and the thickness of the belt is 10mm, determine the width of the belt taking the centrifugal tension in to account. [16]

5. Determine the period of vibration of a weight 'P' attached to springs of stiffness k_1 and k_2, in two different cases as shown in the figure 1. [16]

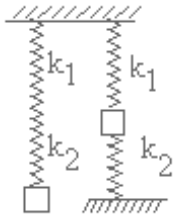

Figure 1

6. Calculate the tension (T) in the guy wire CD and the compression (S) in each strut of the shear leg shown in figure 6. if the vertical load P = 100 kN. [16]

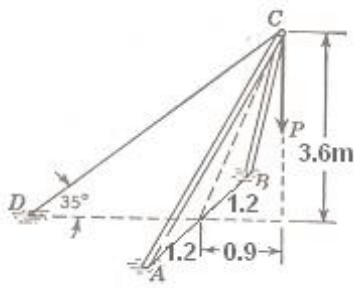

Figure 6

Code No: R05210804 **R05** **Set No. 2**

7. The two 5^0 wedges shown in Figure4 are used to adjust the position of the column under a vertical load of 5 kN. Determine the magnitude of the forces P required to raise the column if the coefficient of friction for all surfaces is 0.40. [16]

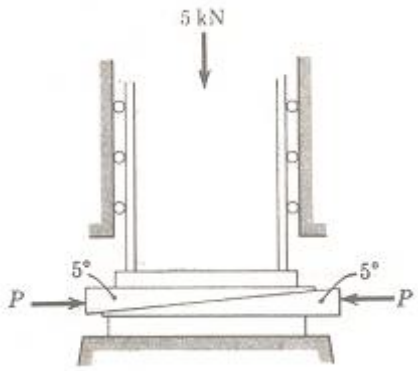

Figure 4

8. (a) Determine the moment of inertia of the shaded area about the x – axis. {As shown in the Figure 8a}. [8+8]

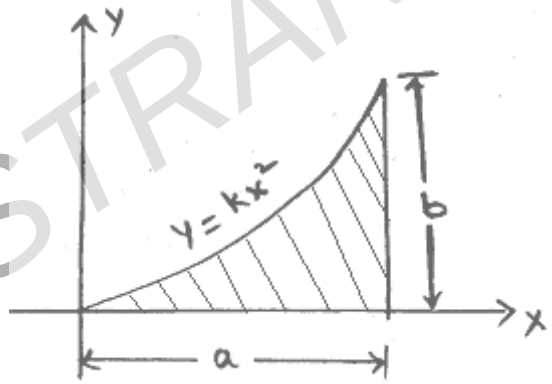

Figure 8a

(b) Determine the centroid of the shaded area, which is bounded by straight lines and a circular arc as shown in figure8b.

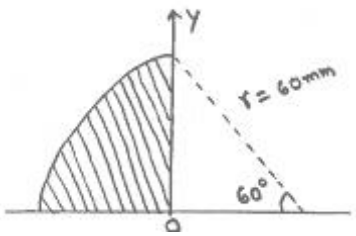

Figure 8b

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05210804 **R05** **Set No. 4**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

ENGINEERING MECHANICS
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

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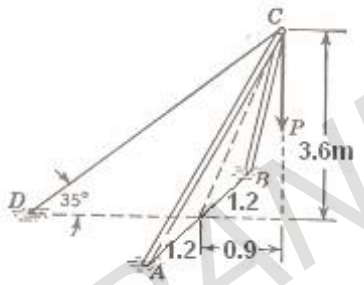

Figure 6

2. The area shown in figure7 is revolved about x –axis to form a homogeneous solid of revolution of mass 'm'. Determine the mass moment of inertia of the solid about x-axis. [16]

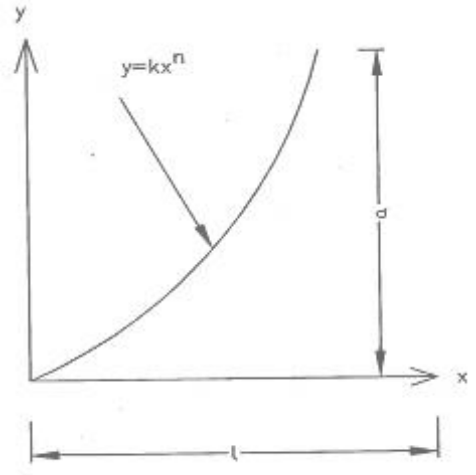

Figure 7

3. A leather belt is required to transmit 9kW from a pulley 1200 mm in diameter running at 200 r.p.m The angle embraced is 165^0 and the coefficient of friction between leather belt and pulley is 0.3. If the safe working stress for the leather belt is $1.4N/mm^2$ the weight of leather is $1000Kg/m^3$ and the thickness of the belt is 10mm, determine the width of the belt taking the centrifugal tension in to account. [16]

4. Determine the period of vibration of a weight 'P' attached to springs of stiffness k_1 and k_2, in two different cases as shown in the figure 1. [16]

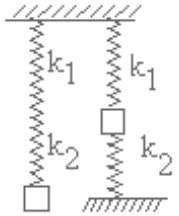

Figure 1

5. (a) The distance covered by a freely falling body in the last one second of its motion and that covered in the last but one second are in the ratio 5:4. Calculate the height from which the body was dropped and the velocity with which it strikes the ground.

   (b) A stationary car attains a maximum permissible speed of 80 km/hour in a distance of 40metres. It continues at this speed for a distance of 200 metres and then a uniform retardation brings it to a stop in 10 seconds. How far does the car travel from the starting point and what is the total elapsed time? [8+8]

6. (a) A homogeneous solid cylinder of weight 100 N whose axis is horizontal rotates about its axis, in frictionless bearings under the action of the weight of a 10N block which is carried by a rope wrapped around the cylinder. What will be angular velocity of cylinder two seconds after the motion starts? Assume the diameter of cylinder as 100cm.

   (b) A block of mass 5Kg resting on a 30^0 inclined plane is released. The block after travelling a distance of 0.5m along the inclined plane hits a spring of stiffness 15N/cm. Find the maximum compression of spring. Assume coefficient of friction between the block and the inclined plane is 0.2. As shown in the Figure 2b. [8+8]

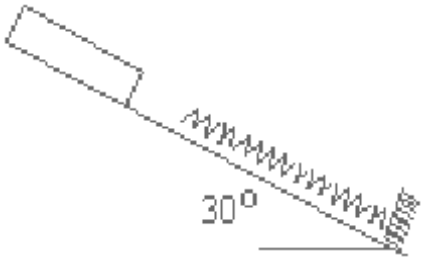

Figure 2b

7. The two 5^0 wedges shown in Figure4 are used to adjust the position of the column under a vertical load of 5 kN. Determine the magnitude of the forces P required to raise the column if the coefficient of friction for all surfaces is 0.40. [16]

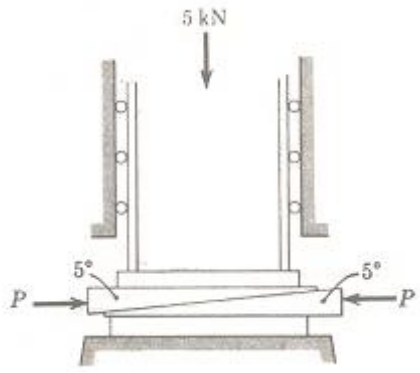

Figure 4

8. (a) Determine the moment of inertia of the shaded area about the x – axis. {As shown in the Figure 8a}. [8+8]

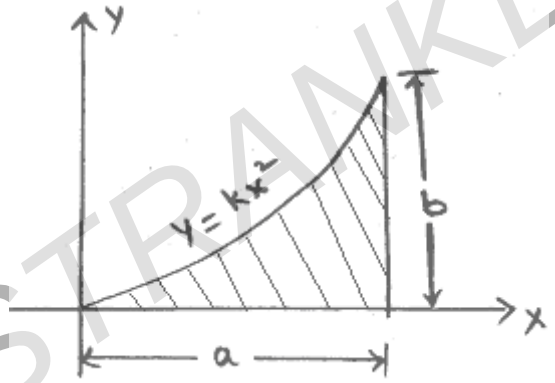

Figure 8a

(b) Determine the centroid of the shaded area, which is bounded by straight lines and a circular arc as shown in figure8b.

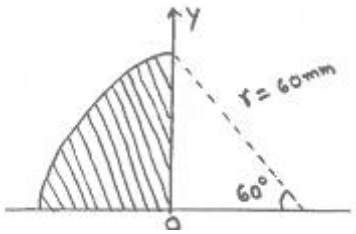

Figure 8b

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05210804 **R05** **Set No. 1**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

ENGINEERING MECHANICS
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

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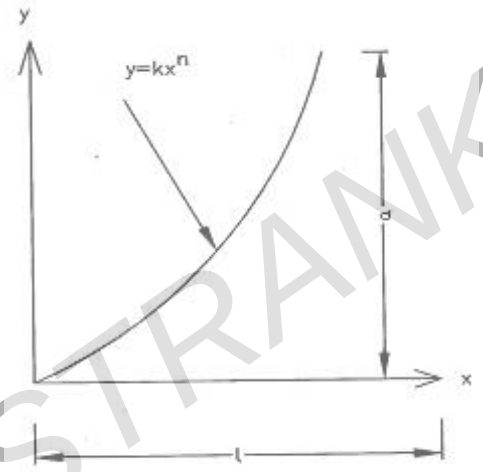

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2. Calculate the tension (T) in the guy wire CD and the compression (S) in each strut of the shear leg shown in figure 6. if the vertical load P = 100 kN. [16]

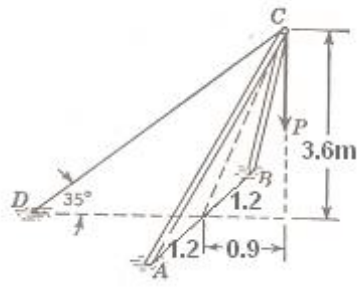

Figure 6

3. A leather belt is required to transmit 9kW from a pulley 1200 mm in diameter running at 200 r.p.m The angle embraced is 165^0 and the coefficient of friction between leather belt and pulley is 0.3. If the safe working stress for the leather belt is $1.4N/mm^2$ the weight of leather is $1000Kg/m^3$ and the thickness of the belt is 10mm, determine the width of the belt taking the centrifugal tension in to account. [16]

Code No: R05210804 **R05** **Set No. 1**

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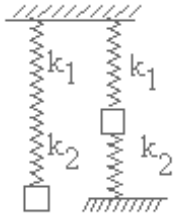

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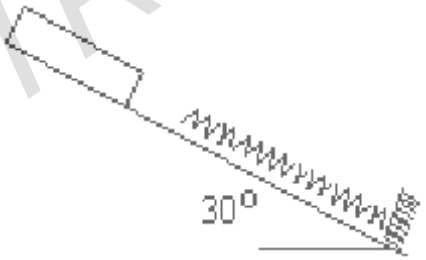

Figure 2b

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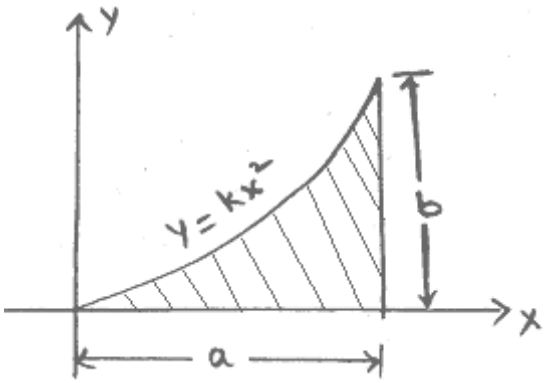
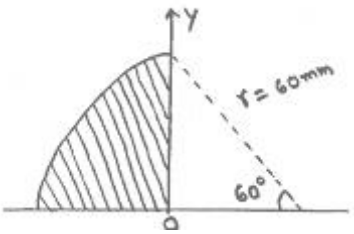


Figure 8a

   (b) Determine the centroid of the shaded area, which is bounded by straight lines and a circular arc as shown in figure8b.

Code No: R05210804 **R05** **Set No. 1**



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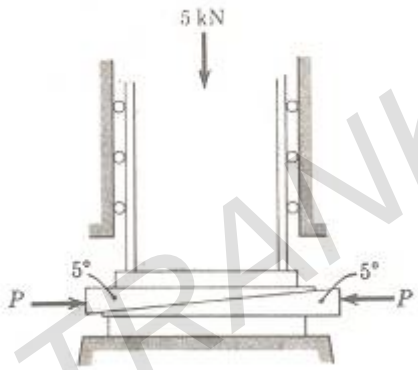

Figure 4

8. (a) The distance covered by a freely falling body in the last one second of its motion and that covered in the last but one second are in the ratio 5:4. Calculate the height from which the body was dropped and the velocity with which it strikes the ground.

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Code No: R05210804 **R05** **Set No. 3**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

ENGINEERING MECHANICS
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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⋆ ⋆ ⋆ ⋆ ⋆

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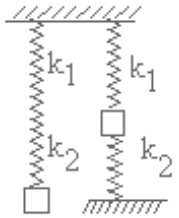

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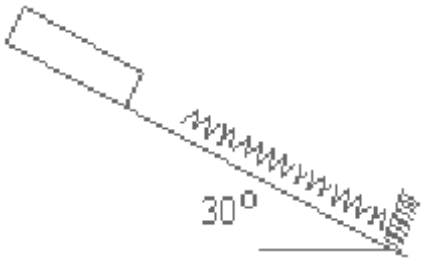

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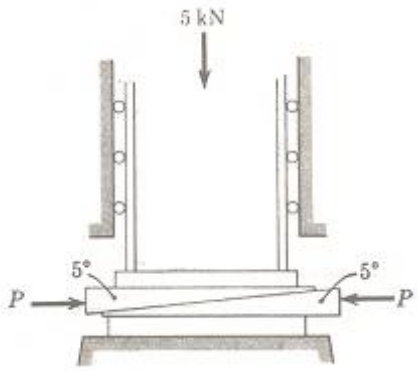

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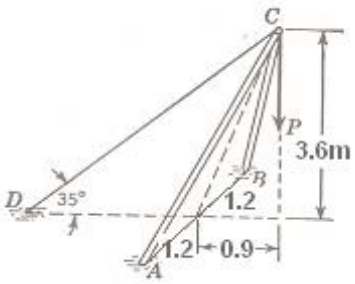

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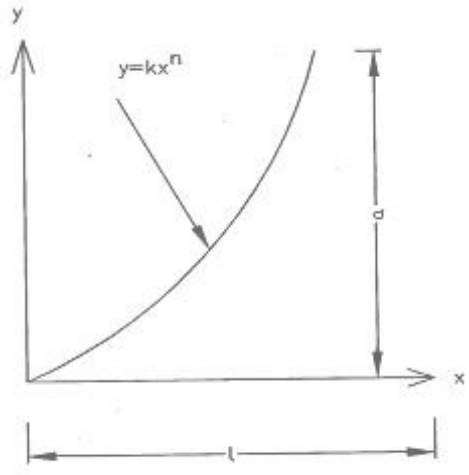
Code No: R05210804 **R05** **Set No. 3**



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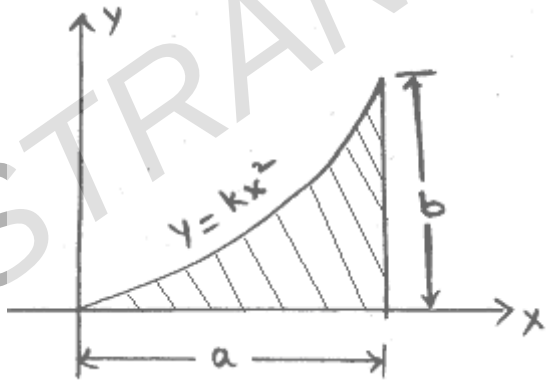

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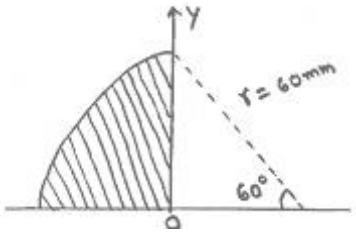

Figure 8b

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