Code.No: R05010105   R05   SET-1

I B.TECH – EXAMINATIONS, JUNE - 2011
APPLIED MECHANICS
(CIVIL ENGINEERING)

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

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

1.a) Explain the conditions of equilibrium for a given system of coplanar:
   i) Concurrent forces and   ii) Non-concurrent forces.
  b) Three cylinders of equal weight 'w' and radii 'r' are resting in a channel of width '5r' as shown in figure 1. Determine the reactions at the points of contact.   [6+10]
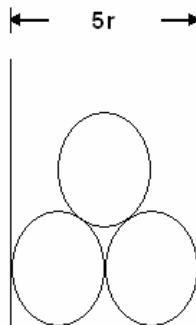

Fig: 1

2.a) State laws of dry friction.
  b) A brake drum is shown in figure 2. Find the moment M to turn the drum at a constant rate. What is the coefficient of friction between drum and rope?   [2+14]
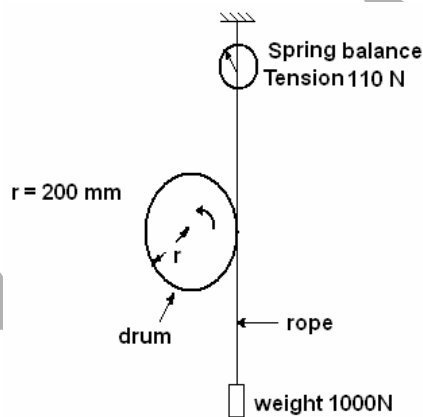

Fig: 2

3.a) Derive an expression to find the length of belt required to connect two pulleys at a given distance between them in case of cross drive?
  b) 75 kW of power is transmitted by a belt at a speed of 15 meters/second. Find the difference in tension between the tight and slack sides.   [8+8]

4.a) State and prove parallel axis theorem.
  b) Determine the moment of inertia of the built up section shown in figure 3, about the horizontal and vertical axis passing through the centroid and radii of gyration.
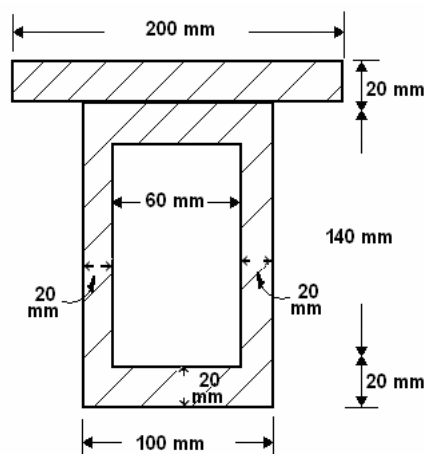   [6+10]

Fig:3

1

Code.No: R05010105   R05   SET-1

5.a) State and prove the parallel axes theorem with reference to the mass moment of inertia.

b) A spherical bob of radius R and mass on b is attached to a slender rod of length 'l' and mass m_r. Calculate the moment of inertia of the assembly about the axis of rotation. [8+8]

6.a) A particle starting from rest moves in a straight line whose equation of motion is given by $S = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 4 seconds.

b) A ball is thrown upwards with an initial velocity of 50 m/sec from top of a building of height 100 m. At the same time another ball is thrown upwards from the ground with an initial velocity of 100 m/sec. Where and how long after starting will they pass. [8+8]

7.a) Derive the work-energy equation for translation.

b) A train of weight 1500 KN is ascending a slope of 1 in 100 with a uniform speed of 30 kmph. Find the power exerted by the engine, if the track resistance is 5N per kN, weight of the train. [4+12]

8.a) Differentiate between simple pendulum and compound pendulum.

b) Find how many seconds a clock would lose per day if the length of the pendulum were increased in the ratio 900: 901. [8+8]

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2

Code.No: R05010105   R05   SET-2

I B.TECH – EXAMINATIONS, JUNE - 2011
APPLIED MECHANICS
(CIVIL ENGINEERING)

Time: 3hours   Max.Marks:80

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

1.a)   Derive an expression to find the length of belt required to connect two pulleys at a given distance between them in case of cross drive?

b)   75 kW of power is transmitted by a belt at a speed of 15 meters/second. Find the difference in tension between the tight and slack sides.   [8+8]

2.a)   State and prove parallel axis theorem.

b)   Determine the moment of inertia of the built up section shown in figure 3, about the horizontal and vertical axis passing through the centroid and radii of gyration.   [6+10]
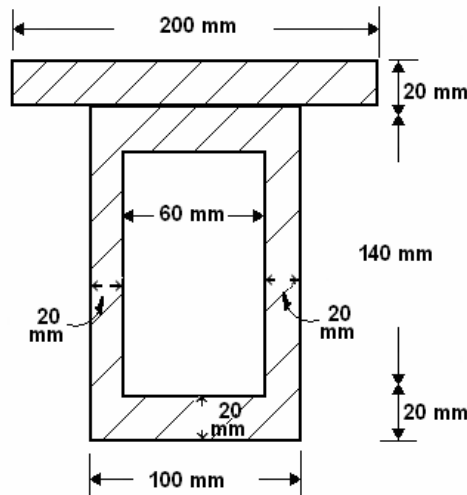

Fig:3

3.a)   State and prove the parallel axes theorem with reference to the mass moment of inertia.

b)   A spherical bob of radius R and mass on b is attached to a slender rod of length 'l' and mass m_r. Calculate the moment of inertia of the assembly about the axis of rotation.   [8+8]

4.a)   A particle starting from rest moves in a straight line whose equation of motion is given by $S = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 4 seconds.

b)   A ball is thrown upwards with an initial velocity of 50 m/sec from top of a building of height 100 m. At the same time another ball is thrown upwards from the ground with an initial velocity of 100 m/sec. Where and how long after starting will they pass.   [8+8]

5.a)   Derive the work-energy equation for translation.

b)   A train of weight 1500 KN is ascending a slope of 1 in 100 with a uniform speed of 30 kmph. Find the power exerted by the engine, if the track resistance is 5N per kN, weight of the train.   [4+12]

6.a)   Differentiate between simple pendulum and compound pendulum.

b)   Find how many seconds a clock would lose per day if the length of the pendulum were increased in the ratio 900: 901.   [8+8]

3

Code.No: R05010105   R05   SET-2

7.a) Explain the conditions of equilibrium for a given system of coplanar:
   i)   Concurrent forces and
   ii) Non-concurrent forces.
 b) Three cylinders of equal weight 'w' and radii 'r' are resting in a channel of width
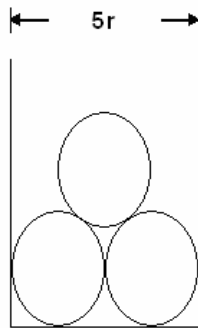   '5r' as shown in figure 1. Determine the reactions at the points of contact.   [6+10]

Fig: 1

8.a) State laws of dry friction.
 b) A brake drum is shown in figure 2. Find the moment M to turn the drum at a
     constant rate. What is the coefficient of friction between drum and rope?   [2+14]
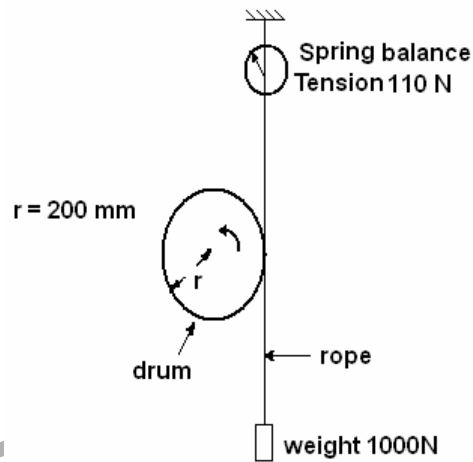

Fig: 2

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4

Code.No: R05010105   R05   SET-3

I B.TECH – EXAMINATIONS, JUNE - 2011
APPLIED MECHANICS
(CIVIL ENGINEERING)

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

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

1.a)   State and prove the parallel axes theorem with reference to the mass moment of inertia.
  b)   A spherical bob of radius R and mass on b is attached to a slender rod of length 'l' and mass m_r. Calculate the moment of inertia of the assembly about the axis of rotation.   [8+8]

2.a)   A particle starting from rest moves in a straight line whose equation of motion is given by $S = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 4 seconds.
  b)   A ball is thrown upwards with an initial velocity of 50 m/sec from top of a building of height 100 m. At the same time another ball is thrown upwards from the ground with an initial velocity of 100 m/sec. Where and how long after starting will they pass.   [8+8]

3.a)   Derive the work-energy equation for translation.
  b)   A train of weight 1500 KN is ascending a slope of 1 in 100 with a uniform speed of 30 kmph. Find the power exerted by the engine, if the track resistance is 5N per kN, weight of the train.   [4+12]

4.a)   Differentiate between simple pendulum and compound pendulum.
  b)   Find how many seconds a clock would lose per day if the length of the pendulum were increased in the ratio 900: 901.   [8+8]

5.a)   Explain the conditions of equilibrium for a given system of coplanar:
       i)   Concurrent forces and
       ii)   Non-concurrent forces.
  b)   Three cylinders of equal weight 'w' and radii 'r' are resting in a channel of width '5r' as shown in figure 1. Determine the reactions at the points of contact.   [6+10]
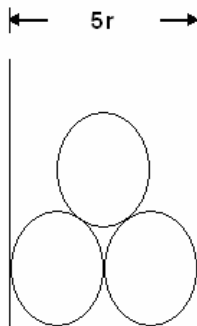

Fig: 1

6.a)   State laws of dry friction.
  b)   A brake drum is shown in figure 2. Find the moment M to turn the drum at a constant rate. What is the coefficient of friction between drum and rope?   [2+14]
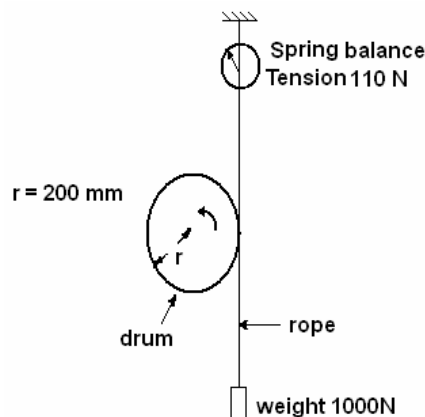

Fig: 2

5

Code.No: R05010105   R05   SET-3

7.a) Derive an expression to find the length of belt required to connect two pulleys at a given distance between them in case of cross drive?
  b) 75 kW of power is transmitted by a belt at a speed of 15 meters/second. Find the difference in tension between the tight and slack sides.   [8+8]

8.a) State and prove parallel axis theorem.
  b) Determine the moment of inertia of the built up section shown in figure 3, about the horizontal and vertical axis passing through the centroid and radii of gyration.
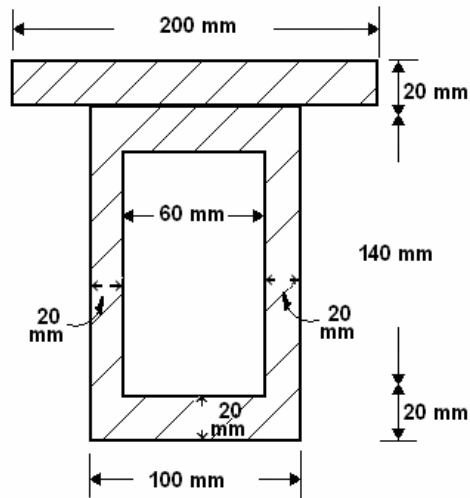   [6+10]

Fig:3

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6

I B.TECH – EXAMINATIONS, JUNE - 2011
APPLIED MECHANICS
(CIVIL ENGINEERING)

Time: 3hours   Max.Marks:80

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

1.a)   Derive the work-energy equation for translation.
  b)   A train of weight 1500 KN is ascending a slope of 1 in 100 with a uniform speed
       of 30 kmph. Find the power exerted by the engine, if the track resistance is 5N per
       kN, weight of the train.   [4+12]

2.a)   Differentiate between simple pendulum and compound pendulum.
  b)   Find how many seconds a clock would lose per day if the length of the pendulum
       were increased in the ratio 900: 901.   [8+8]

3.a)   Explain the conditions of equilibrium for a given system of coplanar:
       i)   Concurrent forces and
       ii)   Non-concurrent forces.
  b)   Three cylinders of equal weight 'w' and radii 'r' are resting in a channel of width
       '5r' as shown in figure 1. Determine the reactions at the points of contact.   [6+10]
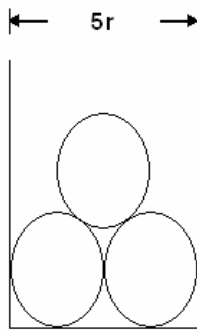

Fig: 1

4.a)   State laws of dry friction.
  b)   A brake drum is shown in figure 2. Find the moment M to turn the drum at a
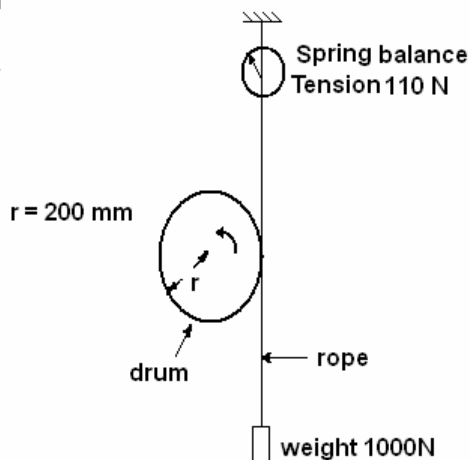   constant rate. What is the coefficient of friction between drum and rope?   [2+14]

Fig: 2

5.a)   Derive an expression to find the length of belt required to connect two pulleys at a
       given distance between them in case of cross drive?
  b)   75 kW of power is transmitted by a belt at a speed of 15 meters/second. Find the
       difference in tension between the tight and slack sides.   [8+8]

7

Code.No: R05010105 | R05 | SET-4

6.a) State and prove parallel axis theorem.
  b) Determine the moment of inertia of the built up section shown in figure 3, about the horizontal and vertical axis passing through the centroid and radii of gyration.
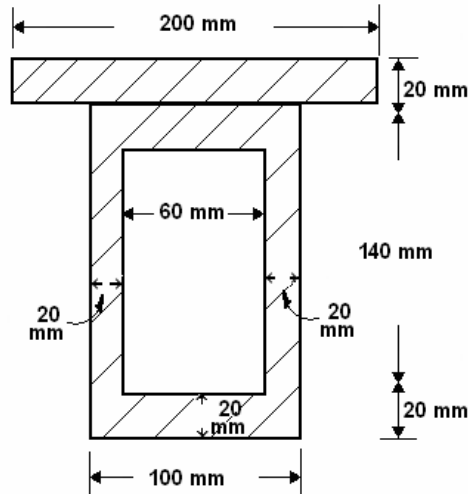[6+10]

Fig:3

7.a) State and prove the parallel axes theorem with reference to the mass moment of inertia.
  b) A spherical bob of radius R and mass on b is attached to a slender rod of length 'l' and mass m_r. Calculate the moment of inertia of the assembly about the axis of rotation. [8+8]

8.a) A particle starting from rest moves in a straight line whose equation of motion is given by $S = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 4 seconds.
  b) A ball is thrown upwards with an initial velocity of 50 m/sec from top of a building of height 100 m. At the same time another ball is thrown upwards from the ground with an initial velocity of 100 m/sec. Where and how long after starting will they pass. [8+8]

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