Exam 2-012

Q1 A force F = (4.0 i + 3.0 j) N acts on a particle as it moves in the x-y plane from the point (0,10 m) to (10 m,0).Calculate the work done on the particle by this force.

A1: 10 J
A2: 25 J
A3: 15 J
A4: 35 J
A5: 20 J

Q2 A 1500 kg car accelerates uniformly from rest to 10 m/s in 3.0 s. The average power delivered by the engine of the car in the first 3.0 s is:

A1: 25 kW
A2: 20 kW
A3: 15 kW
A4: 10 kW
A5: 30 kW

Q3 The amount of work required to stop a moving object (mass = M, speed =V, kinetic energy = K) is equal to:

A1: K
A2: V
A3: MV
A4: V**2
A5: MV/2

Q4 As a particle moves from point A to point B only two forces act on it: one force is non-conservative and does work = -30 J, the other force is conservative and does +50 J work. The change of the kinetic energy of the particle is:

A1: 20 J
A2: 0 J
A3: 30 J
A4: 50 J
A5: 80 J

Q5 A 2.2-kg block starts from rest on a rough inclined plane that makes an angle of 25 degrees with the horizontal. The coefficient of kinetic friction is 0.25. As the block goes 2.0 m down the plane, find the change in the mechanical energy of the block.

A1: –9.8 J
A2: 9.8 J
A3: 19.6 J
A4: –19.6 J
A5: 0.0 J

Q6 A 2-kg block is initially moving to the right on a horizontal frictionless surface at a speed of 10 m/s. It collides with a spring whose spring constant is 100 N/m and is brought to rest momentarily by compressing the spring. Find the compression of the spring.

A1: 1.4 m
A2: 2.0 m
A3: 1.0 m
A4: 1.5 m
A5: 2.5 m

Q7 A uniform plate of the shape shown in Fig. 1. The Q0 center of mass of this plate is located in:

A1: Quadrant 3
A2: Quadrant 2
A3: Quadrant 1
A4: Quadrant 4
A5: at the origin O

Q8 A 4.0 kg object moving on a frictionless surface with speed v explodes into two objects of masses 1.0 kg and 3.0 kg. The 1.0 kg object moves north at 5.0 m/s and the 3.0 kg object moves east at 3.0 m/s. What is v?

A1: 2.6 m/s
A2: 4.0 m/s
A3: 1.7 m/s
A4: 3.3 m/s
A5: 2.0 m/s

Q9 Two particles m1 and m2,5.0-kg each, are initially at rest. External forces F1 and F2, 12 N each, are acting on these particles as shown in Fig.2. The acceleration of the center of mass of the two particles system is:

A1: 1.2 j m/s**2
A2: 1.2 i m/s**2
A3: 0.75i m/s**2
A4: 0.75j m/s**2
A5: (1.2 i + 1.2 j) m/s**2

Q10 A 5-kg object is acted upon by a single force in the x-direction as shown in Fig.3. Find the change of momentum delivered to the object in 6 s.

A1: 20 N.s
A2: 16 N.s
A3: 30 N.s
A4: 10 N.s
A5: 32 N.s

Q11 An elastic collision is one in which:

A1: Kinetic energy and linear momentum are both conserved.
A2: Only kinetic energy is conserved.
A3: Linear momentum is conserved but mass is not conserved.
A4: Only momentum is conserved.
A5: The total impulse is equal to the change in kinetic energy.

Q12 Cart A of mass 3.0 kg and cart B of mass 2.0 kg approach each other on a horizontal air track in such a way that their center of mass has a speed of 4.0 m/s. They collide and stick together. After the collision the kinetic energy of the two carts system is:

A1: 40 J
A2: 16 J
A3: 20 J
A4: 25 J
A5: 50 J

Q13 A rotating wheel has an initial angular velocity W_o. After 3.00 s its angular velocity is 98 rad/s. If it completes 37 revolutions during this 3.00 s interval, find W_o (assume constant angular acceleration).

A1: 57.0 rad/s
A2: 88.0 rad/s
A3: 108 rad/s
A4: 41.0 rad/s
A5: 32.0 rad/s

Q14 The rigid body shown in Fig. 4 is rotated about an axis perpendicular to the paper and passing through point P. If M = 0.40 kg, a = 30 cm, b = 50 cm, find the work required to increase the angular velocity of the body from rest to 5.0 rad/s. (Neglect the force of friction, mass of the connecting rods and treat the particles as point masses).

A1: 2.6 J
A2: 2.9 J
A3: 3.4 J
A4: 1.2 J
A5: 4.3 J

Q15 A uniform rod of mass M = 1.2 kg and length L = 0.80 m is pivoted at point P and rests on a horizontal smooth surface (Fig. 5). If a force (F =5.0 N, theta = 40 degrees) is applied as shown, find its angular acceleration about point P.

A1: 10 rad/s**2
A2: 16 rad/s**2
A3: 12 rad/s**2
A4: 8.0 rad/s**2
A5: 33 rad/s**2

Q16 A student in a class demonstration is sitting on a frictionless rotating chair with his arms by the side of his body. The chair-student system is rotating with an angular speed w. The student suddenly extends his arms horizontally. The angular velocity of the system:

A1: decreases
A2: increases
A3: remains the same
A4: may increase or decrease depending on the mass of the student
A5: may increase or decrease depending on the mass of the chair

Q17 A solid cylinder of mass M and radius R starts from rest and rolls down an incline plane making an angle of 30 degrees with the horizontal. The linear speed of its center, after it has traveled 5 m down the incline, is: (Icm = 1/2* M* R**2)

A1: 5.7 m/s
A2: 3.8 m/s
A3: 2.5 m/s
A4: 4.9 m/s
A5: 1.3 m/s

Q18 Force F = (2.0i –3.0j) N, acts on a mass located at r = (0.50i +2.0j) m. Find the resulting torque (in N.m) about the origin.

A1: –5.5 k
A2: +5.5 k
A3: +2.5 k
A4: –2.5 k
A5: 0.0 k

Q19 An 800-N man stands halfway up a 5.0-m ladder of negligible weight. The base of the ladder is 3.0 m from the wall as shown in Fig. 6. Assuming that the wall-ladder contact is frictionless, the wall pushes against the ladder with a force of:

A1: 300 N
A2: 100 N
A3: 200 N
A4: 150 N
A5: 380 N

Q20 A solid copper cube has an edge length of 85.5 cm. How much pressure (in N/m**2) must be applied to the cube to reduce the edge length to 85.0 cm? The bulk modulus of copper is 1.4* 10**11 N/m**2.

A1: 2.44* 10**(9)
A2: 4.32* 10**(10)
A3: 8.37* 10**(9)
A4: 6.47* 10**(9)
A5: 5.00* 10**(8)

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FIGURE 1

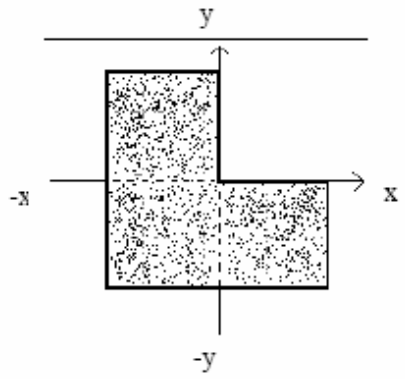

FIGURE 2

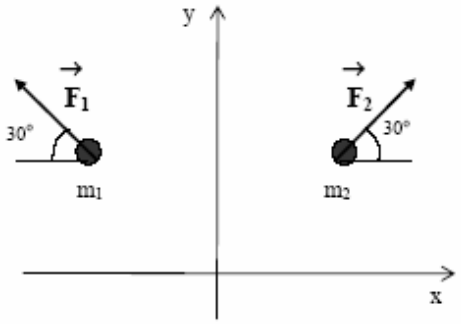

FIGURE 3

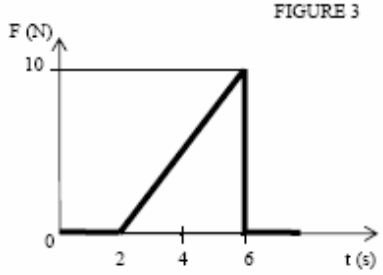

FIGURE 4

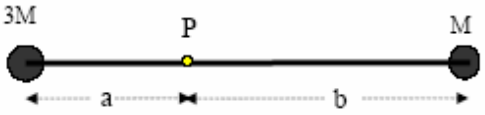

FIGURE 5

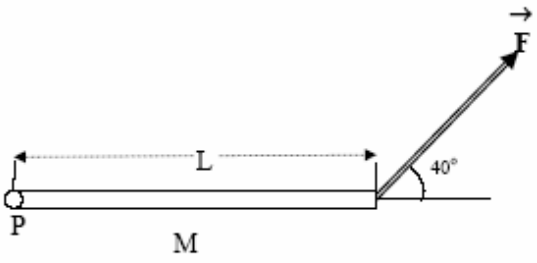

FIGURE 6