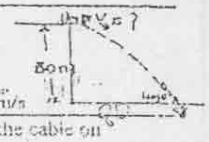
Jordan university of science & Tech. Phys (101) Fall 98/99
Department of Physics B Final Exam.

Q1: An object has a velocity of (4 m/s) when it starts to decelerate (يبطئ) according to $a = -t/2$, where a is measured in m/s^2, and t in seconds. What is the time it takes the object to stop?
a) 8 sec b) 5.7 sec c) 2.8 sec d) 4 sec

Q2: A stone is released from a balloon which is descending (هابط) at constant speed of (10m/s). After (10 sec) the speed of the stone in m/s is.
a) 110 b) 200 c) 190 d) 210

Q3: What is the angle between the two vectors $A = 2i+2j+k$, $B = 3i+4k$
a) 43° b) 86° c) 48° d) 35°

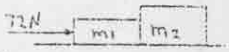
Q4: A stone is thrown horizontally from the top of a (80 m) high building. It strikes (يصطدم) the ground at an angle of (45°). With what speed was it thrown.



a) 20 m/s b) 40 m/s c) 5 m/s d) 10 m/s

Q5: A 1000 kg elevator accelerates downward at (3 m/s2). The force exerted by the cable on the elevator in kN is.
a) 4.9 b) 9.1 c) 7 d) 2.1

Q6: Two blocks (m_1= 4kg), (m_2=20 kg) are pushed along a horizontal frictionless surface by a force of (72N) as shown, what is the force that m_1 exerts on m_2.



a) 30 N b) 36 N c) zero d) 60 N

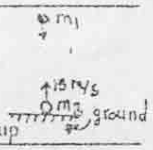
Q7: A (0.2 kg) object on the end of a string rotates in a circular motion on a horizontal frictionless table. The object completes (116.3)revolutions every minute. If the radius of the circle is (0.6 m). What is the tension in the string.

a) 17.8 N b) 7.4 N c) 0.75 N d) 29.6 N

Q8: A ball of mass m is suspended at the end of a massless cord of length L as shown. The ball is drawn horizontally aside and then released. What is the tension in the cord at the lowest point of its swing ?

a) 6mg b) 2mg c) 3 mg d) mg

Q9: At the same instant that a ball of mass m1= 0.5 kg is dropped from a very high altitude (ارتفاع), another ball of mass m2= 0.25 kg is thrown vertically up from the surface of the ground with velocity of 15 m/s . What is the velocity of the center of mass of the two balls after three seconds.

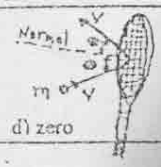


a) 15 m/s down b) 25 m/s down c) 30 m/s up d) 20 m/s up

Q10: A 2 kg mass moving with 50 m/s velocity makes a head on elastic collision with 4 kg mass moving in the opposite direction with (-25 m/s) velocity. The velocities of the 2 kg and the 4 kg masses in m/s immediately after the collision respectively are :
a) (-75,150) b) (-150,75) c) (50,-25) d) (-50,25)

Q11: A wheel starts from rest and rotates about a fixed axis with constant angular acceleration of ($4\ rad/s^2$). What time it takes to complete 20 revolutions.
a) 5.6 sec b) 3.2 sec c) 4.0 sec d) 7.9 sec

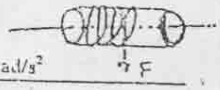
Q12: A tennis ball of mass m rebounds from a racket with the same speed it had initially as shown. What is the magnitude of the impulse delivered to the ball?



a) 2mv sin(θ) b) 2mv cos(θ) c) 2mv d) zero

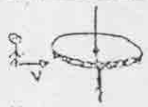
$g = 10\ m/s^2$

Q13: A rope is wrapped around a cylinder of radius (0.1 m) and a moment of inertia (I_c= 0.02 kg m^2). If the free end of the rope is pulled by a force (F=2 N), what is the angular acceleration of the cylinder.



a) 5 rad/s2 b) 0.5 rad/s^2 c) 10 rad/s^2 d) 2 rad/s^2

Q14: A man of (80 kg) mass runs at a speed of (2.8 m/s) along the tangent to a (160 kg) disk (I_c=MR^2/2, radius R=2m), the disk is initially at rest but can rotate freely about its center.
Find the angular speed of the disk after the man jumps on the disk.

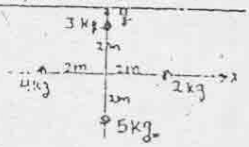


a) 1 rad/s b) 0.7 rad/s c) 0.5 rad/s d) 2 rad/s

Q15: A 20 kg child stands at the center of a disk which has a 3m radius and a 600 kg m^2 moment of inertia, and rotates with an angular speed of 2.1 rad/s. Find the angular speed of the disk as the child walks from the center to the rim (حافة) of the disk.

a) 1.6 rad/s b) 2.7 rad/s c) 0.8 rad/s d) 0.61 rad/s

Q16: A system of four particles as shown ,is rotating about the Z-axis with an angular speed of 2.83 rad/s
Find the kinetic energy of the system



a) 112 J b) 56 J
c) 64 J d) 224 J

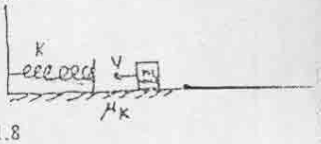
Q17: A 3 kg object has a velocity (v=5i+3j) m/s at the position (r = -3i+2j) m . What is its angular momentum about the origin.

a) -57 k b) 24 k c) 24(i+j) d) 57 k

Q18: An object is sliding down an incline with a velocity of 3 m/s . the incline makes an angle (θ=20) with the horizontal. If μ_k =0.7. What distance does the particle travel before it comes to a stop.

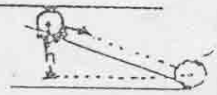
a) 4.24 m b) 0.41 m c) 8.47 m d) 1.43 m

Q19: A 4 kg mass collides with a fixed spring whose force constant k=50 N/m. the spring is compressed (انضغط) by a distance of (0.7 m) from the equilibrium position. If the coefficient of kinetic friction between the mass and the surface is 0.2. Then the velocity of the mass at the instant of collision in m/s is:



a) 3.0 b) 2.4 c) 2.6 (d) 1.8

Q20: A solid sphere of mass (M=2 kg, R=10 cm, I_c=2MR^2/5) rolls without slipping (متدحرج دون انزلاق) down an incline starting from rest and from a height (h=130 cm). Find the velocity of the center of mass at the lowest point on the incline, in units of m/s.



a) 3.6 b) 4.3 c) 3.4 d) 6.7

Student Name..... Reg. Number.....

Section Number..... Lecturer.....

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g= 10 m/s^2

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