# ECE 105 Quiz 9

## Thursday’s Quiz

Question 1 (individual stage):

A particle executes SHM such that at a given time it is at x= +1/4 of the amplitude, moving away from equilibrium, and 0.7 seconds later the particle is at = -1/2 of the amplitude, also moving away from equilibrium. Find the period of the motion.

Group Stage

For the following use the cosine form for the dependence of the position on time.

1. For the first instance the velocity is
2. Positive
3. Negative
4. Can be either or
5. Not enough info to tell
6. For the first instance the sign of acceleration
7. Cannot be determined
8. Is positive
9. Can be positive or negative
10. Is negative
11. For the first instance the phase angle is in
12. The third quadrant
13. The first quadrant
14. The second quadrant
15. The fourth quadrant
16. For the second instance the phase angle is in
17. The third quadrant
18. The first quadrant
19. The second quadrant
20. The fourth quadrant
21. The difference in phase between the two times, {Phase angle 2} - {Phase angle 1}
22. Can never be negative
23. Can be negative
24. Is negative
25. Can be negative or positive

## Friday’s Quiz

Individual Stage

The disk in the figure rolls without slipping on the surface. It is attached to the free end of a spring, the other end of which is attached to a wall. From the equilibrium position the sphere is moved by a certain amount and released from rest. Find the period of oscillations.

Group Stage

1. The force of friction on the disk
2. Dissipates mechanical energy
3. Is equal to the maximum force of static friction
4. Acts in the direction of motion
5. Does not dissipate any mechanical energy
6. If the wheel is displaced to the right of equilibrium, and we define counter-clockwise to be positive, then the net torque on the disk is
7. Zero
8. Negative
9. Positive
10. Positive or negative depending on whether the pivot is chosen to be at the centre of mass, or at the point of contact with the ground.
11. The total mechanical energy for the system when it is a distance x form equilibrium should in general be
13. None of the above
14. Taking the derivative of the mechanical energy with time we should get


18. None of the above.
19. To come up with the differential equation for SHM one
20. Must use the energy approach
21. Can use energy or the force/torque approach
22. Cannot use the force/torque approach
23. Must use only the torque/force approach

## Solution to Thursday’s Quiz

θ1= arccos (1/4), either 75.52 or 360-75.52, since object is moving away from equilibrium then the latter

θ2 has to be arccos (-1/2) which is 2π/3 (+2π)

two choices now,

either Δθ = 2π /3+2π - θ1

or

Δθ = 75.52\*π /180+2π /3,

ω = Δθ/0.7 = 4.875

either way, period is T=2π/4.875 =1.29 s.

## Solution to Friday’s Quiz

x

x