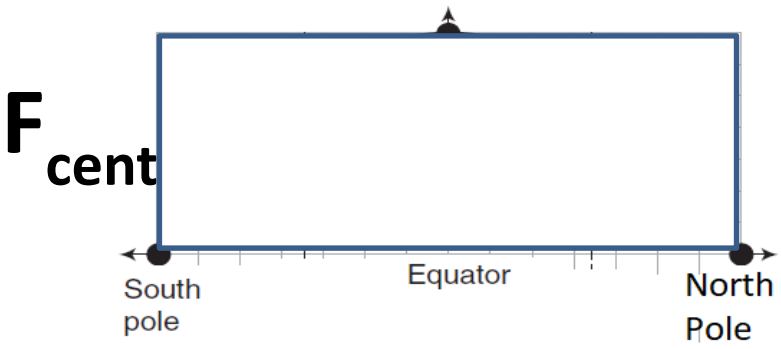
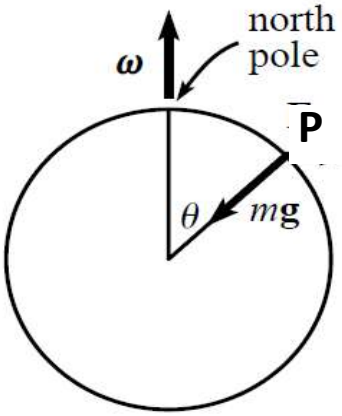
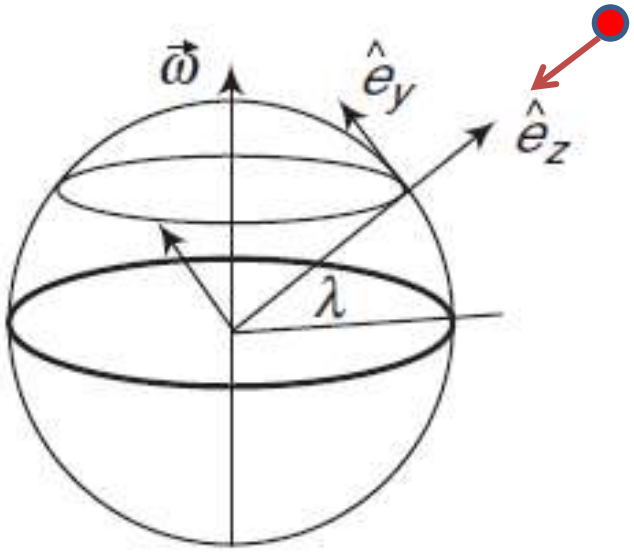
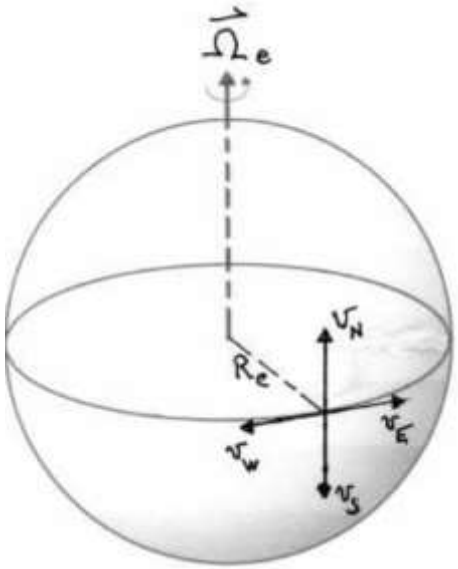
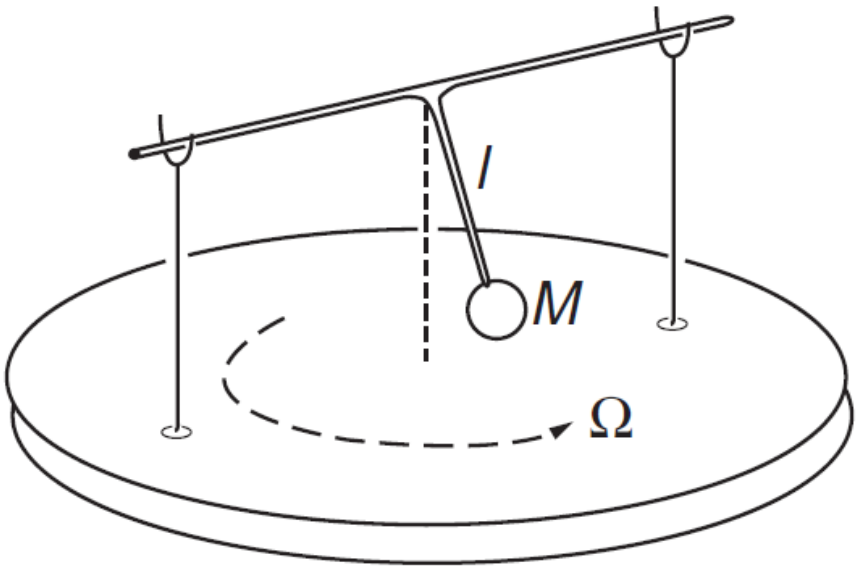
	INDIAN INSTITUTE OF TECHNOLOGY PATNA **DEPARTMENT OF PHYSICS** **Tutorial 7**	
12/02/21	**PH103**	
1	**1. A person is standing still on a location P as shown in figure 1 on Earth.** **a. Plot the nature of $F_{cent.}$** **b. What is the effective gravity felt by him due to the centrifugal force?**   Fig 1	
2	**Consider an object is dropped under gravity in the $-e_z$ direction as shown in figure. In the problem, consider λ as the latitude and ω as the angular velocity of the earth.** **a. What is the nature of the Coriolis force?** **b. Find the coriolis speed and deflection of the object due to the force.** **c. What is the nature of Coriolis force if the object is thrown upward.** 	

3	**A high speed hydrofoil races across the ocean at the equator at a speed of 200 miles/hour. Let the acceleration of gravity for an observer at rest on the earth be *g*. Find the fractional change in gravity measured by a passenger on the hydrofoil due to coriolis force when the hydrofoil heads in the following directions** **a) East** **b) West** **c) South** **d) North** 
4	**A pendulum is rigidly fixed to an axle held by two supports so that it can swing only in a plane perpendicular to the axle. The pendulum consists of a mass M attached to a massless rod of length l. The supports are mounted on a platform which rotates with constant angular velocity Ω.** **Find the pendulum's frequency assuming that the amplitude is small.**


l
M
Ω