

國立高雄大學九十七學年度研究所碩士班招生考試試題

系所：

科目：普通物理

應用物理學系碩士班磁性與半導體組

是否使用計算機：是

考試時間：100 分鐘

應用物理學系碩士班奈米組

本科原始成績：100 分

1. (15%) A solid, uniform disk of mass M and radius R is oscillating about an axis through P . The axis is perpendicular to the plane of the disk. Suppose the friction at P can be ignored. The distance from P to the center, C , of the disk is b (see figure 1). The gravitational acceleration is g .
- When the displacement angle is θ , what then is the torque relative to point P ?
 - What is the moment of inertia for rotation about the axis through P ?
 - The torque causes an angular acceleration about the axis through P . Write down the equation of motion in terms of the angle θ and the angular acceleration.

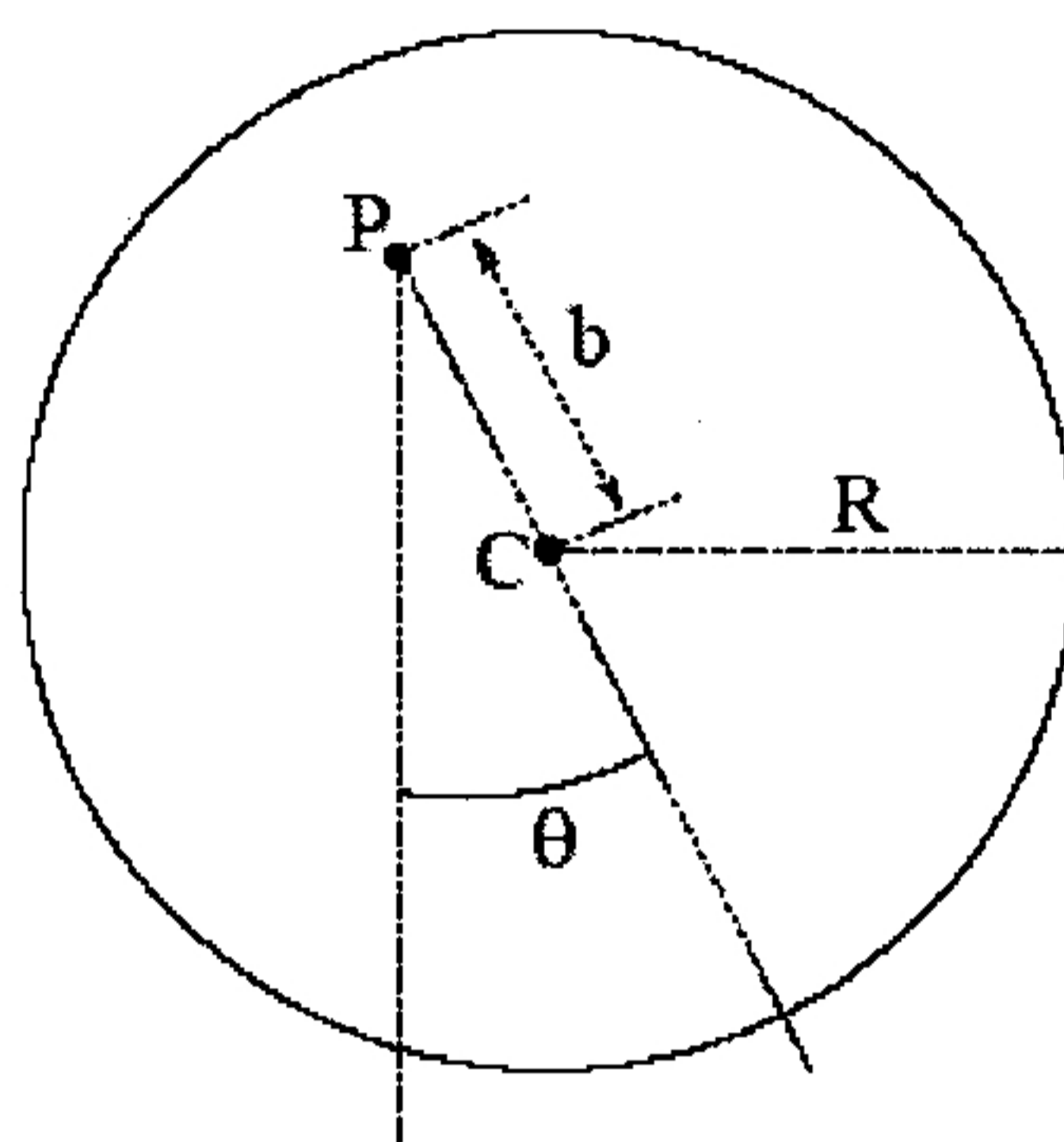


Figure 1

- (20%) Describe the classical *Hall effect* experiment. What important information does the *Hall effect* provide if the strip is made of a semiconductor?
- (20%) A long straight solid cylindrical conducting wire with radius R carries a steady uniform current I .
 - Calculate the magnetic field energy inside a length l of the wire.
 - What is the contribution of the interior portion of the conductor to the total self-inductance?
- (25%) Describe the *Photoelectric effect* experiment. Please interpret its physical meaning and significance.
- (20%) Briefly give the definition of following terms, please deliver relation formulas if need:
 - Work-Energy principle.
 - Zero, first and second laws of thermodynamics.
 - Huygen principle.
 - Dielectrics, Ferromagnets, Semiconductors and Superconductors.