



Student's Name : \_\_\_\_\_

**1) Aim of practical :**

To determine with the help of a Strobe light the rotational speed of a rotor. ( Flywheel of an engine, rotor of an electric motor, rotor of a toy helicopter, etc ... ).

**2) Materials :**

>> Electric motor with speed controller.

A small remote control helicopter ( diameter of main rotor about 15 cm ) is ideal for use in this practical

>> Stroboscopic light

**3) Modus Operandi :**

- 1) Mark a spot on one of the blades of the rotor.
- 2) Start the electric motor and set a moderate constant speed.
- 3) Start the strobe light on the lowest frequency.
- 4) Increase the frequency of the strobe light until the blades appear stationary.
- 5) Record the corresponding frequency ( in Hz ).
- 6) Repeat these measurements for different values of rotational speeds.



**4) Safety precautions :**

- 1) Never look directly at the strobe light nor direct it towards anyone's eyes.
- 2) Do not touch the rotor while it is rotating.

**5) Data :**

	Setting # 1	Setting # 2	Setting # 3	Setting # 4
Frequency ( Hz )				
Rotational speed ( turns per second )				
Rotational speed ( rpm )				

**6) Extension #1 :**

for a given setting, once you have found the rotational frequency, change the strobe light frequency to twice the previous value. What do you observe. How can you explain it ?

**7) Extension #2 :**

Each blade of the propellers of the Air Warfare Destroyer has a mass of 1.5 tonnes.

The diameter of the propellers is 4.65 m and the maximum rotational speed is equal to 170 RPM.

The centre of gravity of each blade is distant from the axis of the propellers by about 60 % of the maximum radius of the propellers.

Calculate the centrifuge force experienced by each blade when the propellers is turning at full speed.