

SHORT ANSWER QUESTIONS:-

Q-1 What is gyroscope?

Q-2 What is gyroscopic couple?

Q-3 What do you mean by Precessional angular velocity?

~~Short~~ Long Answer Questions:

Q-1 Explain the <sup>effect of</sup> gyroscopic couple on turning of an aeroplane with neat and clean sketch.

Q-2 Explain the effect of gyroscopic couple on turning of a naval ship. ~~is~~ with neat and clean sketch. (steering, rolling and pitching)

Q-3 What is the effect of gyroscopic couple on stability of four wheel drive moving on a curved path.

Q-4 !. The turbine rotor of a ship has a mass of 2.2 tonnes and rotates at 1800 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 320 mm. Determine the gyroscopic couple and its effect when

(i) The ship turns right at a radius of 250 m with a speed of 25 km/h.

(ii) The ship pitches with the bow rising at an angular velocity of  $0.8 \text{ rad/sec}$ .

(iii) The ship rolls at an angular velocity of  $0.1 \text{ rad/sec}$ .

Q-5: Derive the equation of gyroscopic couple.

Q-6: A uniform disc of diameter  $300 \text{ mm}$  and of mass  $5 \text{ kg}$  is mounted on one end of an arm of length  $600 \text{ mm}$ . The other end of the arm is free to rotate in a universal bearing. If the disc rotates about the arm with a speed of  $300 \text{ rpm}$  clockwise looking from front, with what speed will it precess about the vertical axis?

Q-7 A flywheel having a mass of  $20 \text{ kg}$  and radius of gyration of  $300 \text{ mm}$  is given a spin of  $500 \text{ rpm}$  about its axis which is horizontal. The flywheel is suspended at a point  $250 \text{ mm}$  from the plane of rotation of the flywheel. Find the rate of precession of the wheel.