**GYROSCOPE**

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| **Gyro:** Circular Motion  **Cross Product:** |  |  | |  |
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| **Linear Momentum:** | **Angular Momentum:** | | | |

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| **Newtons 2nd Law of Motion:** | | Magnitude: | | Direction: |
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| **CASE-I:** Let the direction of angular velocity remains same w. r. t. time. only it’s magnitude is changing. | | **CASE-II:** Let the magnitude of angular velocity remains same w. r. t. time. only it’s direction is changing. | | |
| Acceleration: | Retardation: |  | | |
|  |  | Magnitude: | Direction: | |

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| **Newtons 3rd Law of Motion:** Every action has equal and opposite reaction.  Hence, for all Active gyroscopic, Reactive gyroscopic Will be present in the system. |

**GYROSCOPIC PHENOMENON:**

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| Spin Direction of Angular Momentum  Precession (): Direction about which direction of angular momentum changes.  Reactive Gyroscopic Torque: |  | **Axis** | **Planes** |
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**DIAGRAM METHOD:** It’s almost same as table method with Torque diagram. This diagram will give the active gyroscopic torque direction. Reactive Gyroscopic torque will be opposite to Active Gyroscopic torque.

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| **AEROPLANES** | **NAVAL SHIP** |
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**FOR NAVAL SHIP:**

1. **Steering:** Turning of the ship either towards starboard side or port side in known as steering.
2. **Pitching:** Oscillation of the ship about horizontal transverse axis is known as pitching. Bow will rise or fall.
3. **Rolling:** Oscillationof the ship about longitudinal axis.

**NOTE:**

1. Sometime Pitching is given in SHM.

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1. There will be no gyroscopic effect due to Rolling.