**1. STATICS**

**FORCE:** It requires Magnitude, direction and point of application.

**RESOLUTION OF FORCES:** If a force makes angle with X axis then,

|  |  |
| --- | --- |
| The component will be along X axis. | The component will be along Y axis. |

**THEOREM OF TRANSMISSIBILITY:** Force can be shifted along it’s line of action without changing It’s effect.

|  |  |  |
| --- | --- | --- |
| **MOMENT: .** | Clockwise Considered | Anti-Clockwise Considered |

1. Use Right hand thumb rule to determine the direction of moment.
2. Moment value on any point on line of action of force is zero.

**THEOREM OF VARIGNON:**

Moment of a force about a point is same as moment vector addition of component of force about the same point.

**COUPLE:** Two Equal and opposite force separated by some distance creates couple.

|  |  |
| --- | --- |
|  | It can’t produce translation effect. |
| It can only produce rotational effect. | It can be only balanced by another equal and opposite couple. |

|  |  |  |
| --- | --- | --- |
| **TYPES OF FORCES** | | |
| **COPLANAR** | **PARALLEL** | **CONCURRENT** |
| All Forces are in one plane. | Forces are parallel to each other | Forces Passing through single point |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EQUILIBRIUM CONDITIONS** | | | | | |
|  |  |  |  |  |  |

For Co-Planar forces there are 3 equations only for equilibrium condition.

**EQUILIBRIUM OF TWO FORCES:** Two forces can be in equilibrium if they are,

|  |  |  |
| --- | --- | --- |
| Equal in magnitude | Opposite in direction | Colinear |

|  |  |  |
| --- | --- | --- |
| **RESULTANT OF TWO FORCES:** Resultant force is obtained when two forces are not in equilibrium condition.  **PARALLELOGRAM LAW:** |  | **COSINE RULE:** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Like Forces | Unlike Forces |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **RESULTANT OF COPLANAR FORCE SYSTEM** |  |  |

**CONDITION FOR EQUILIBRIUM OF 3 FORCES:**

1) Co-Planar, 2) Concurrent, 3) Polygon must be a closed triangle

|  |  |
| --- | --- |
| **LAMI’S THEOREM/ SINE RULE:**  It’s valid for 3 forces are in equilibrium |  |

|  |  |  |
| --- | --- | --- |
| **TYPES OF JOINTS OR SUPPORTS** | | |
| **ROLLER SUPPORT** | **PIN OR HINGE SUPPORT** | **FIXED SUPPORT** |
| Support and Connection Types | Support and Connection Types | Support and Connection Types |

Above Arrow signs indicates the Possible opposite reactions.

|  |  |
| --- | --- |
| **FREE BODY DIAGRAMS (FBD):**   1. Weight of The Part 2. External Force on The Body 3. Support Reactions    1. Normal Reaction    2. Frictional Force 4. Inertia Force | **TOTAL SYSTEM FREE BODY DIAGRAMS (FBD):**   1. Weight of The Parts 2. External Forces 3. Support Reactions    1. Normal Reaction    2. Frictional Force 4. Inertia Forces 5. No Internal Forces |

**TENSILE FORCE:** Show tension towards the other end.