

COURSE NAME : EXERCISE THERAPY – I

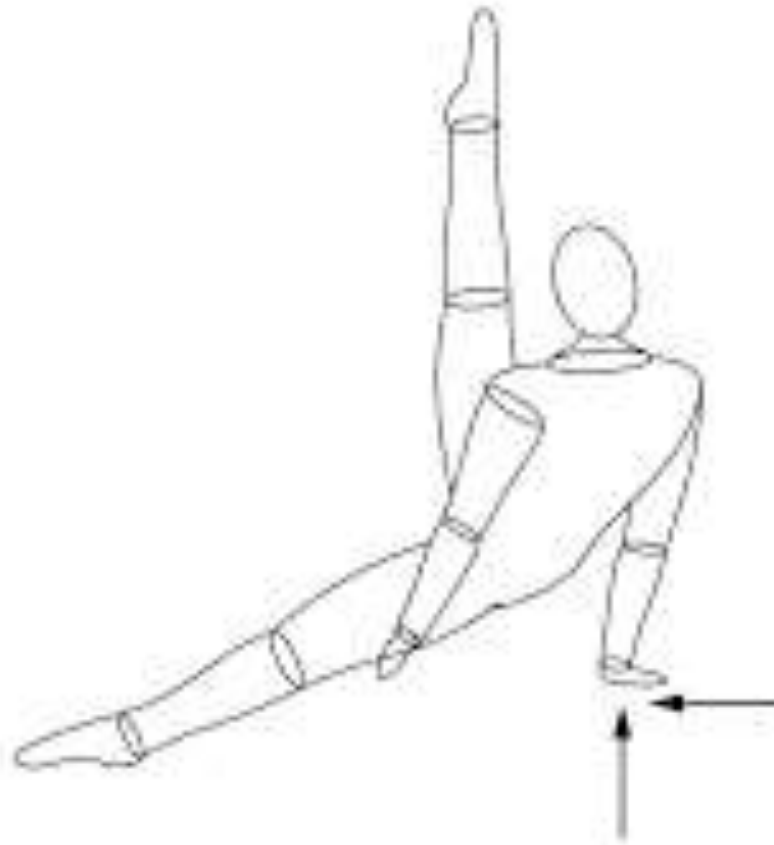
COURSE CODE : 746278

TITLE : APPLIED BIOMECHANICS – PART II

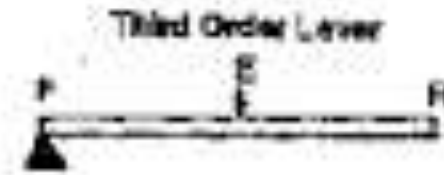
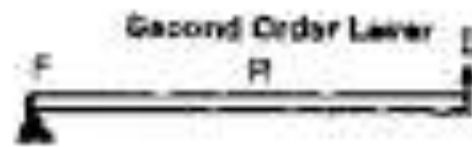
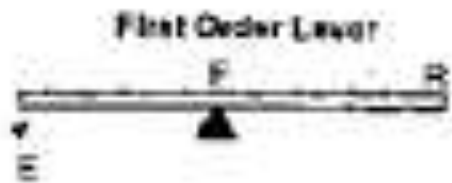
NAME : EZHILARASU T

DESIGNATION : ASSOCIATE PROFESSOR

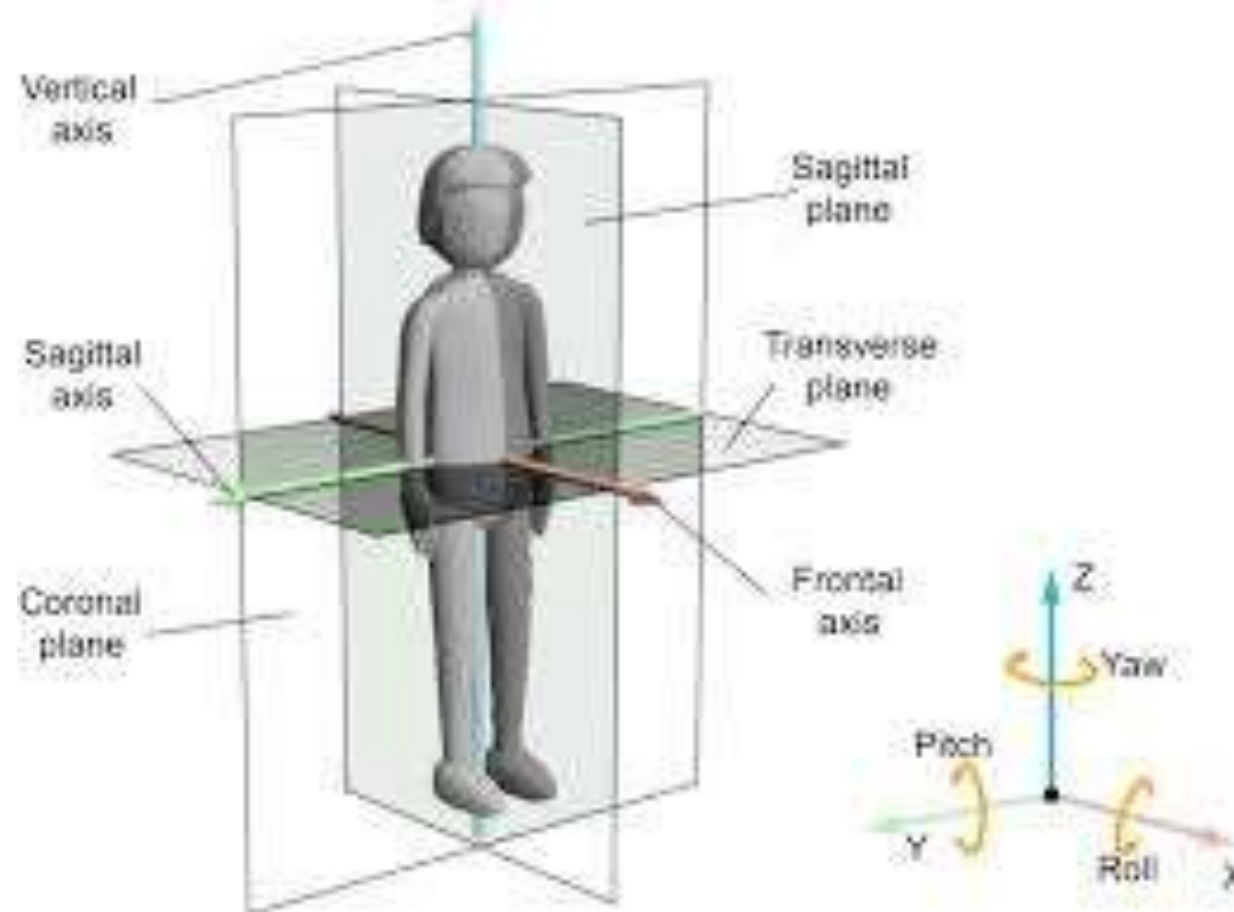
APPLIED BIOMECHANICS – PART II



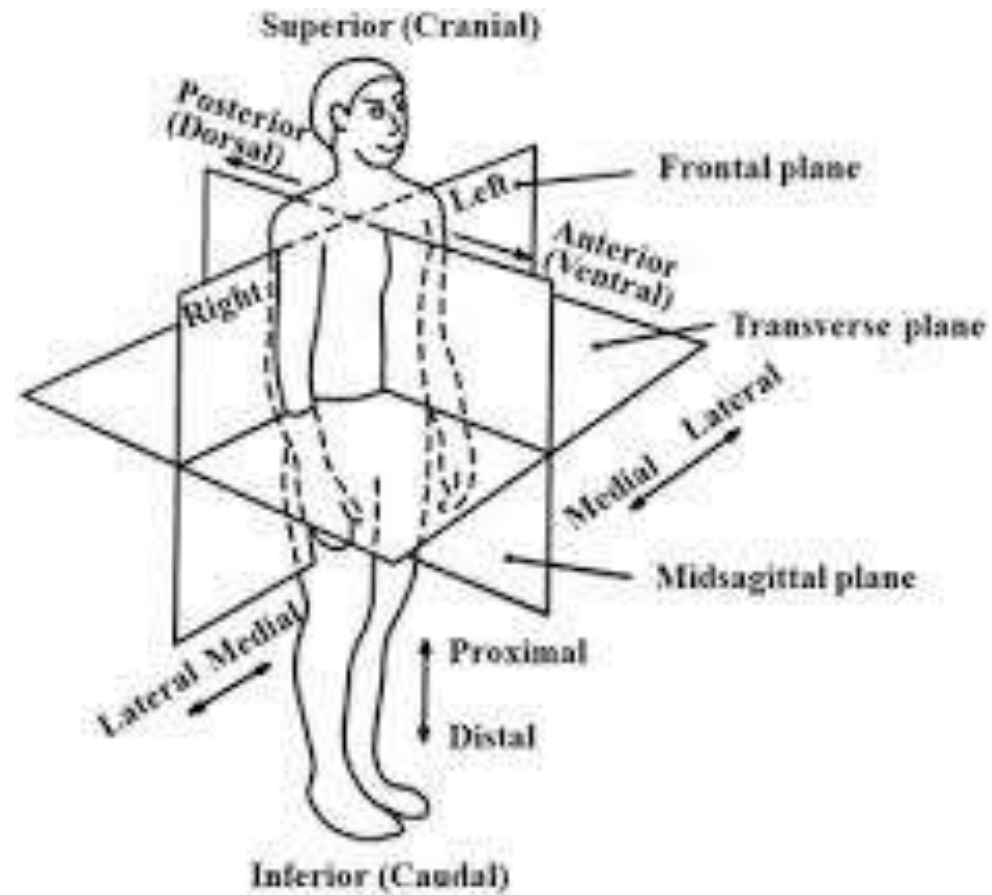
LEVERS



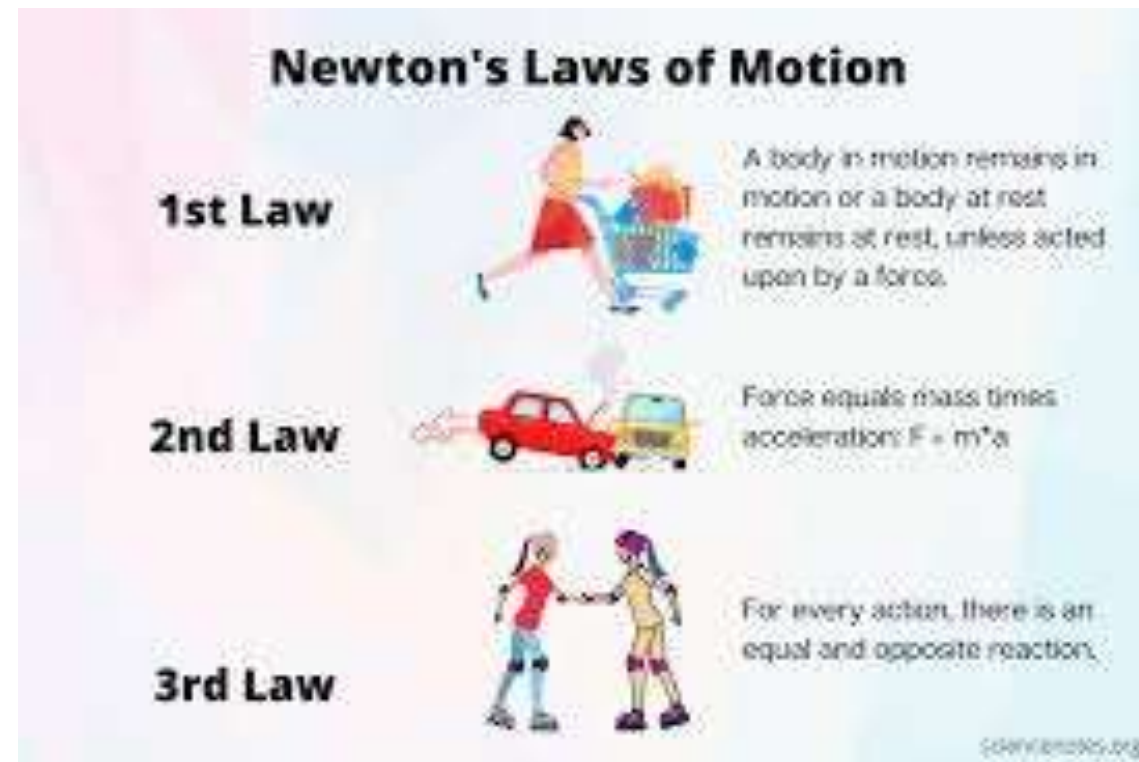
AXIS



PLANES



NEWTON LAWS OF MOTION



DEFINITION OF SPEED, VELOCITY, WORK, ENERGY, POWER, ACCELERATION, MOMENTUM

Sec 1 Physics –
What is the Difference Between Speed, Velocity, and Acceleration?
Tutorly.sg explains it in simple words!

Speed	Velocity	Acceleration
		
Speed is how fast an object is moving, but it doesn't tell you the direction.	Velocity is how fast and in which direction an object is moving.	Acceleration is the rate at which an object's velocity changes over time.
<i>Example:</i> A car moving at 60 km/h.	<i>Example:</i> A car moving at 60 km/h to the north.	<i>Example:</i> A car speeding up from 0 to 60 km/h in 10 seconds or slowing down when hitting a bump.

Useful Formulas

1. Force: $F = m \times a$
2. Work: $W = F \times d \times \cos(\theta)$
3. Power: $P = W / t$
4. Kinetic Energy: $KE = \frac{1}{2} \times m \times v^2$
5. Potential Energy: $PE = m \times g \times h$
6. Momentum: $p = m \times v$
7. Newton's Second Law: $F = \Delta p / \Delta t$
8. Gravitational Force: $F = G \times (m_1 \times m_2) / r^2$
9. Ohm's Law: $V = I \times R$
10. Electric Power: $P = V \times I$

$$work = force \times displacement \text{ ----- (i)}$$

$$work = (mass \times acceleration) \times displacement$$

The dimensions for force is given as

$$Force = mass \times acceleration$$

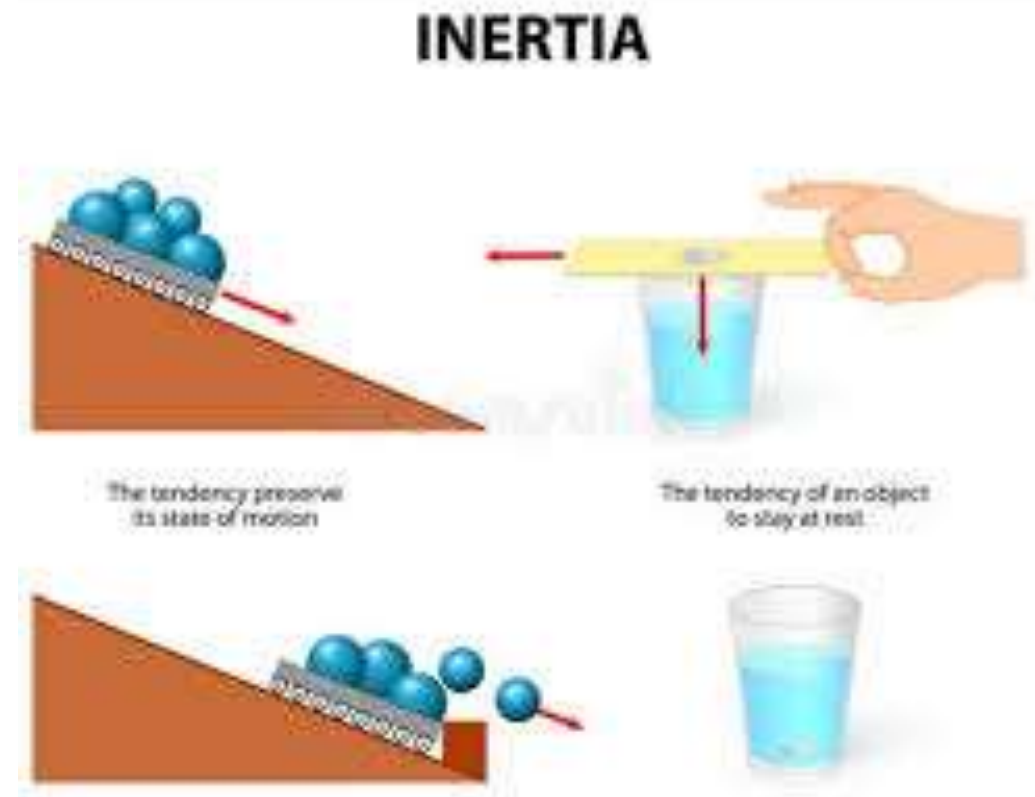
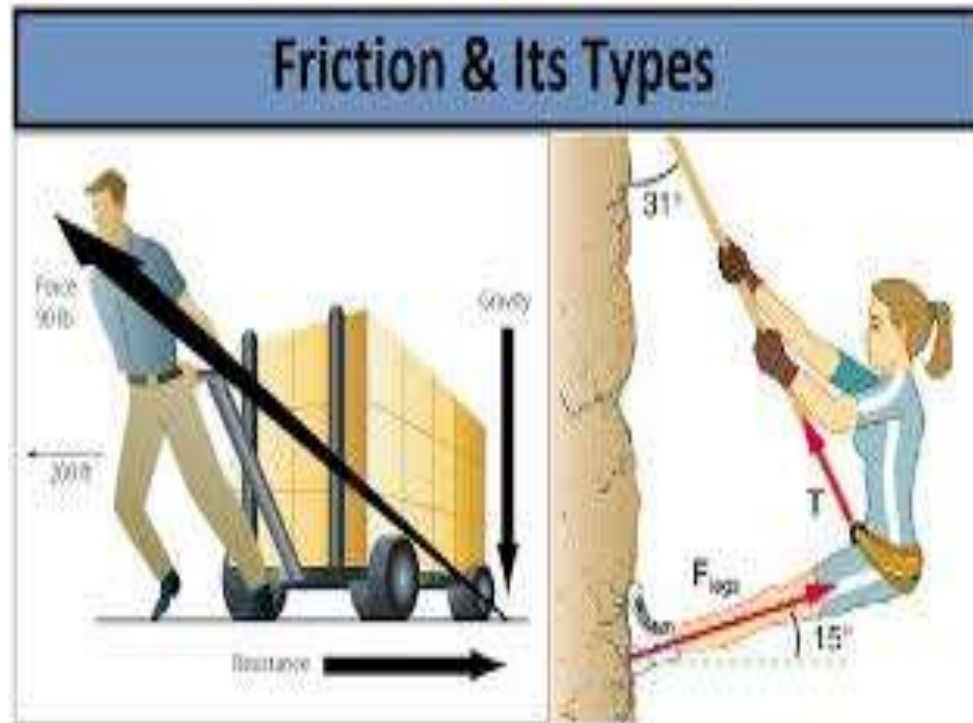
$$mass = [M]$$

$$acceleration = [L^1 T^{-2}]$$

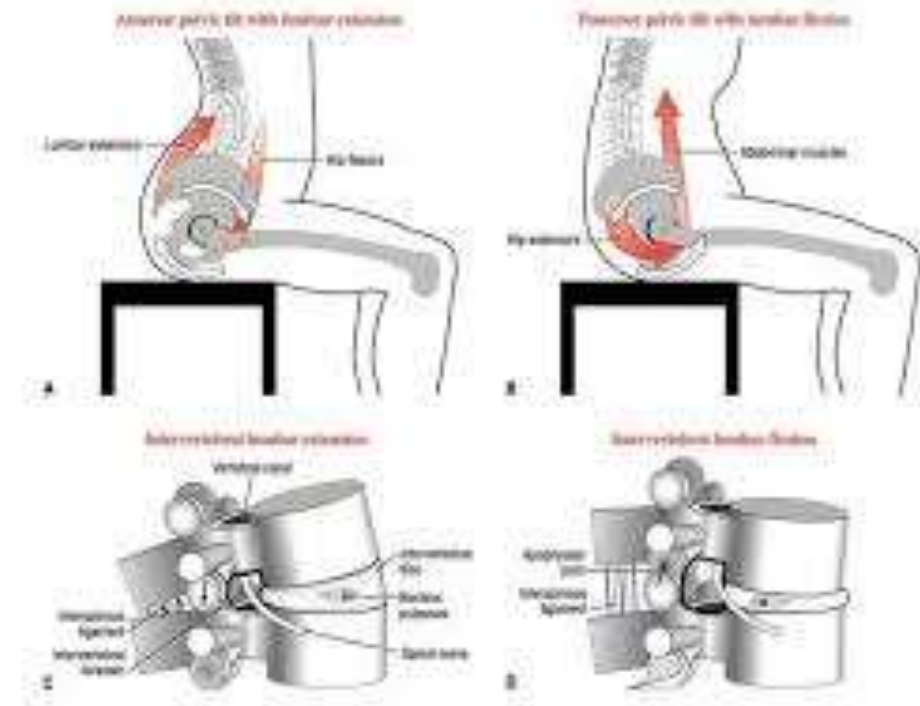
$$Force = [M] \times [L^1 T^{-2}]$$

$$Force = [M^1 L^1 T^{-2}] \text{ ----- (ii)}$$

FRICTION, INERTIA



PELVIC TILT



INCLASS ASSESSMENT

1. In a typical biceps curl (elbow flexion with weight in hand), the musculoskeletal system mainly acts as which class of lever?

- a) First-class lever
- b) Second-class lever
- c) Third-class lever
- d) Fourth-class lever

2. Movements occurring in the sagittal plane take place around which axis?

- a) Sagittal axis
- b) Frontal (coronal) axis
- c) Vertical axis
- d) Transverse axis

3. Which of the following statements is MOST consistent with Newton's third law of motion?

- a) A body remains at rest or in uniform motion unless acted on by an external force
- b) Acceleration is proportional to the net force and inversely proportional to mass
- c) For every action, there is an equal and opposite reaction
- d) Force equals mass multiplied by displacement

INCLASS ASSESSMENT

4. In the context of human movement, which option correctly pairs a term with its definition?

- a) Speed – displacement per unit time in a specified direction
- b) Velocity – distance per unit time irrespective of direction
- c) Work – product of force and displacement in the direction of the force
- d) Power – resistance multiplied by acceleration only

5. Anterior pelvic tilt is MOST commonly associated with which muscle pattern?

- a) Tight abdominals and tight gluteus maximus
- b) Weak hip flexors and weak lumbar extensors
- c) Tight hip flexors and tight lumbar extensors
- d) Weak hip flexors and tight hamstrings

INCLASS ASSESSMENT

Answer

1. c) Third-class lever
2. b) Frontal (coronal) axis
3. c) For every action, there is an equal and opposite reaction
4. c) Work – product of force and displacement in the direction of the force
5. c) Tight hip flexors and tight lumbar extensors

THANK YOU!!!!

References Books:

- +Kisner & Colby - Therapeutic Exercises : Foundations and Techniques
- +Dina Gardiner - Exercise Therapy
- +Lakshminarayan - Textbook of Therapeutic Exercises
- +Roshan Meena - Exercise Therapy Principles and Practice
- +Phyllis Fletcher Cook and Margaret Hollis - Practical Exercise Therapy