1. Discuss human biological, ergonomic, and psychological capabilities and limitations

Biological capabilities and limitations :

Humans have strengths like flexibility, adaptability, and sensory perception but are limited by fatigue, aging, and susceptibility to disease or injury. Muscular strength and endurance vary between individuals and decline with age.

Ergonomic Capabilities and Limitations :

Ergonomic focuses on designing systems and tasks that fit human physical attributes. Capabilities include the ability to operate tools and adapt to new environments. Limitations arise when designs ignore human needs, leading to discomfort or injury. e.g. poor posture due to inadequate furniture.

Psychological Capabilities and Limitations :

Humans excel at problem-solving, decision-making, and creativity but are prone to stress, mental fatigue, and reduced focus under pressure. Psychological limitations can impair performance when cognitive load exceeds capacity or stress levels are too high.

2. what is physical work capacity, and explain the evalution of work capacity tests?

A physical work capacity (pwc):

This is the maximum level of physical activity an individual can perform, measured by energy expenditure, oxgen intake, or endurance over time. It depends on factors like age, fitness, and health.

Evalution of work capacity tests:

Tests include aerobic capacity tests (e.g. vo2max), strength tests, and endurance assessments.

Methods include:

- Treadmill / Bike Ergometer Tests: Measures oxgen uptake and heart rate.
- Grip strength Tests: Assesses muscle strength.
- step Test: Evaluates Cardiovascular endurance through step frequency and heart rate recovery.

3. what is anthropometry important in industrial design?

A Anthropometry involves measuring human body dimensions and is essential for creating products, tools, and spaces that fit human users.

Importance:

- Improves comfort: Ensures furniture, equipment, and tools are ergonomic.
- Enhances safety: Reduces risk of injuries from

poorly designed systems.

- Increases Efficiency : Matches design to user dimensions, reducing fatigue and improving performance.

Example : Designing adjustable chairs to accommodate various body sizes.

4. Why is ergonomicis important in the workspace ? what are the limitations of anthropometric data ?

A. Importance of Ergonomics in workspace :

- Reduces musculoskeletal disorders caused by prolonged sitting or repetitive tasks.
- Enhances productivity by ensuring a comfortable and efficient work environment.
- Improves mental well-being by reducing stress and creating a positive workplace.

Limitations of Anthropometric Data :

- Data may not represent all populations (eg. cultural or regional differences).
- variability due to age, gender, and body types makes standardization difficult.
- outdated data may not reflect modern population changes (e.g. obesity trends).

5. what is machine control, and what are the uses of multiple displays? Explain.

Machine Control:

Machine control refers to systems of devices used to operate machines, ensuring efficiency, accuracy, and safety. Examples include levers, buttons, touchscreens, and automated controls.

used of Multiple Displays:

- Increases Efficiency: Enables multitasking by presenting information across several screens (eg. in aviation of command centers).
- Improves information clarity: Displays different types of data simultaneously, avoiding clutter.
- Facilitates Monitoring: useful in control rooms for tracking multiple parameters in real time.

Example: A pilot's cockpit uses multiple displays to show altitude, speed, and navigation.