**DPT 4th Semester**

**Course Title: Exercise Physiology Instructor: Ahmed Hayat**

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 **Final Term Assignment Marks: 50**

***NOTE: Mention your name and roll number on the assignments.***

1. **If you lifted a 10-kilogram (Kg) weight upward over the distance of 2 meters (m), the work performed would be? Calculate Work.**

**ANSWER**: The formula used for calculating work is:

 W= Fxd

i-e: Force=mg

 so F= 10kgx 10m/s2

 F= 100N

Now putting in Work formula W= Fxd

W= 100Nx 2m

**W= 200J**

1. **Enlist basic principles of the training**.

**ANSWER**: TRAINING PRINCIPLES:

**Training Principle 1: Overload**

Human body is required to exert itself beyond the normal stress levels of training. Put simply, you need to ‘suffer’ in training in order to progress. This doesn’t mean every single session you need to be putting yourself in the ‘pain cave’ but you will need to check in regularly to ensure you are pushing yourself enough for the body to reset its current fitness levels.

**Training Principle 2:** **Progression**

Overload refers to the stress of a single session, progression relates to the short, medium and long-term development of an athlete. In a well-periodized program, the athlete should be challenged regularly to attain new levels of fitness to ensure better performance is given.

**Training Principle 3: Recovery**

When you are pushing your limits you are in the process of breaking down your body. Building recovery time into any training program is important because this is the time that the body adapts to the stress of exercise and the real training effect takes place. Recovery also allows the body repair damaged tissues.

**Training Principle 4: Specificity**

This put simply means that you’ll get better at what you do. If you want to improve your swimming, then swim more. If you want to improve your running, then run more. There are many other modalities of exercise that will have some transfer regarding their benefit to you, but nothing beats training specifically for the disciplines you are trying to improve.

**Training Principle 5: Reversibility**

Failure to regularly adhere to your training program will result in you going backward. So that massive training block you did 6 months ago won’t mean much now if you haven’t done anything since.

**Training Principle 6: Individual Response to Training Stimulus**

One size does not fit all, so when one athlete has a great response to a training program the temptation is there to try and get everyone to follow the same program. We need to consider all the principles above, how we apply these in a practical sense is more important.

1. **Describe preload and afterload in simple words**.

**ANSWER**

**Preload** is the initial stretching of the cardiac myocytes prior to contraction. It is related to ventricular filling, also known as the left ventricular end diastolic pressure (LVEDP), is the amount of ventricular stretch at the end of diastole. It is considered as a big squeeze of the ventricles during systole. You can remember it by analogy of a balloon by blowing air into the balloon and it stretches the more air you blow air into it, the more it stretches.

**Afterload** is the force or load against which the heart has to contract to eject the blood.

It is also known as the systemic vascular resistance (SVR). The opening of aortic valve will take place to push blood out of the heart into the body. Balloon analogy can be used here, afterload is represented by the knot at the end of the balloon. To get the air out, the balloon must work against that knot and in the same way heart must overcome resistance to open aortic valve.

1. **What are the factors increasing stroke volume.**

**ANSWER:
DEFINITION:** Stroke volume (SV) is the volume of blood pumped from the left ventricle per beat

**Factors increasing troke volume**:

1. **Preload**

An increase in the volume or speed of venous return will increase preload and, through the Frank–Starling law of the heart, will increase stroke volume.

1. **Contractility**: Contraction will take place resulting in decrease end systolic volume and increase stroke volume
2. **Afterload**: Decreased peripheral resistance will decrease end systolic volume resulting in increased stroke volume.
3. **Plasma volume**: increase in plasma volume, increases preload and stroke volume.
4. **Ventricular volume**: increase in ventricular volume increases preload and hence stroke volume increases.
5. **Filling time and venous return**: increases preload and hence stroke volume increases.
6. **Differentiate between isometric, isotonic and isokinetic exercises.**

 **DIFFERETIATION**

|  |  |  |
| --- | --- | --- |
| **Isometric** | l**sotonic** | **Isokinetic** |
| a) Isometric exercise involves static muscle contraction against a stationary resistance. | a) Isotonic exercise involves dynamic movement but doesn't require a constant movement speed. | a) This involves movement but maintains a constant speed. |
| b) It is used only in a few games like gymnastics, weightlifting. Wresting. etc. | b) Isotonic exercise is most popular and effective type of strength training used in almost all games/sports. | b) Isokinetic generally involves muscle contraction against an electronic resistance and is specific to a particular sport. |
| c) It develops maximum strength. | c) It develops explosive strength. | c) It develops explosive strength as well as strength endurance. |
| d) Iso-same, metric-length: this is a type of muscle contraction in which muscle remains at same length. | d) Iso-same, tonic-tension. A type of muscle contraction in which the muscle changes the length either shortening or lengthening. | d) Iso-same, kinetic-speed. Isokinetic exercises are done with machine that regulates movement, velocity and resistance. |
| e) It can rehabilitate immobilized joint.  | e) Does not contribute to rehabilitation. | e) It cannot rehabilitate immobilized joint. |
| f) Amount of strength developed does not last long. | f) Strength developed through this method remains for longer period. | f) Amount of strength developed is excellent. |
| g) Poor development of coordination and skill. | g) It develops excellent coordination. | g) It develops good coordination.  |
| h) Does not contribute to development of endurance and speed | h) It contributes to development of strength, endurance and speed | h) Better development of speed as compared to Isotonic |
| (i) Examples are: (i) Pushing against a wall (ii) Flexed arm hang, etc  | (i) Its examples are: (i) Push-ups, pull- ups. (ii) Rope climbing, bench press. overhead press, etc. | (i) Its examples are: (i) Treadmill (ii) Cybex (iii) Butterfly stroke in swimming, etc. |